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UNITED STATES GEOLOGICAL SURVEY

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Bulletin 747

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# GEOLOGIC LITERATURE ON NORTH AMERICA

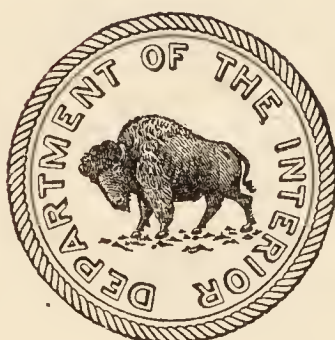
1785-1918

BY

JOHN M. NICKLES

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PART II. INDEX



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# GEOLOGIC LITERATURE ON NORTH AMERICA, 1785-1918.

By JOHN M. NICKLES.

## PART II. INDEX.

### INTRODUCTION.

The publications here indexed are listed in Part I, Bibliography (Bulletin 746), where the names of the authors are arranged in alphabetic order and the titles of their books and papers are preceded by the numbers used in this index after the authors' names. This number consists of the last two figures of the year of publication, with an added letter (a, b, c, etc.) when there is more than one title in a year; the figures are printed in italics for books or papers published before the year 1819.

### ABBREVIATIONS.

[The abbreviations for the names of States and for the provinces of Canada are given in Part I.]

**Anon** anonymous papers, placed at the end of Part I

**Co.** county

**cos.** counties

#### CORPORATE AUTHORS.

**Am G** American Geologist  
**Am Geog Soc** American Geographical Society  
**Boston Soc N H** Boston Society of Natural History  
**Cal Ac Sc** California Academy of Sciences  
**Cal M As** California Miners' Association  
**Cal St M Bur** California State Mining Bureau  
**Can G S** Canada, Geological Survey  
**Can M Br** Canada, Mines Branch  
**Can Parl** Canada, Parliament  
**Conn G S** Connecticut Geological and Natural History Survey  
**Hawaiian Vol Obs** Hawaiian Volcano Observatory  
**Ill G S** Illinois State Geological Survey

**Int G Cong** International Geological Congress  
**Mass H R** Massachusetts, House of Representatives  
**Mass St Bd Educ** Massachusetts State Board of Education  
**Md C C** Maryland Conservation Commission  
**Md G S** Maryland Geological Survey  
**Me St S Com** Maine State Survey Commission  
**Mex I G** México, Instituto Geológico  
**Miss G S** Mississippi State Geological Survey  
**Mo B G** Missouri Bureau of Geology and Mines  
**N J G S** New Jersey Geological Survey  
**N Y G S** New York Geological Survey  
**N Y St Mus** New York State Museum  
**Nat Geog Soc** National Geographic Society



<b>Ohio St Univ</b> Ohio State University	<b>U S Dp Int</b> United States, Department of the Interior
<b>Okla G S</b> Oklahoma Geological Survey	<b>U S G S</b> United States Geological Sur- vey
<b>Ont R Com</b> Ontario, Royal Commis- sion.	<b>U S G S Terr</b> United States Geological Survey of the Territories
<b>Oreg B M</b> Oregon Bureau of Geology and Mines	<b>Va G S</b> Virginia Geological Survey
<b>Pa G S</b> Pennsylvania Geological Survey	<b>W Va G S</b> West Virginia Geological Sur- vey
<b>Pa Gen As</b> Pennsylvania, General As- sembly	<b>Wash Ac Sc</b> Washington Academy of Science
<b>Pa Top G S Com</b> Pennsylvania Topo- graphic and Geologic Survey Com- mission	<b>Wash G S</b> Washington Geological Sur- vey
<b>R Ont Nickel Com</b> Royal Ontario Nickel Commission	<b>Wis G S</b> Wisconsin Geological and Natural History Survey
<b>Smiths Inst</b> Smithsonian Institution	<b>Wyo St G</b> Wyoming, State Geologist
<b>Tenn Agr Exp Sta</b> Tennessee Agri- cultural Experiment Station	
<b>U P R Co</b> Union Pacific Railroad Com- pany	

# INDEX.

[The name and number following the colon refer to Part I, where the title and citation are given. The number consists of the last two figures of the year of publication.]

Abandoned valleys, Ohio basin: Campbell (M R), 01a  
 Aberdeen-Redfield folio, S. Dak. (no. 165): Todd, 09  
 Abitibi region, Ontario: Johnston (J F E), 02; Wilson (W J), 02  
 Abrasive materials: Katz, 13b; King (F P), 94; Phalen, 08c; Pratt, 01h; U S G S, 83; Canada: McLeish, 10, 14  
 Absaroka folio, Wyo. (no. 52): Hague, 99b  
 Absaroka Range, Tertiary volcanoes: Hague, 99c  
 Abstraction of potassium during sedimentation: Watson (J W), 13  
 Acadia, physiography: Daly, 01  
 Acadian geology: Dawson (J W), 55  
 Accident-Grantsville folio, Md.-Pa.-W Va. (no. 160): Martin (G C), 08a  
 Aceratherium, Miocene, S. Dak.: Osborn, 93b  
 Achaenodon: Osborn, 83  
 Acidaspis: Clarke (J M), 91a  
 Acrostichopteris, revision of: Berry, 10f  
 Adamites and pre-Adamites: Winchell (A), 78  
 Adams, C. B., biography: Seely, 03  
 Addresses.  
     American geological history: Dana (J D), 56a  
     American geological science, indebtedness to Canada: Dawson (J W), 87  
     Antiquity of man: Penck, 09a  
     Applied geology: Brooks (A H), 12  
     Aspects of modern petrology: Harker, 11  
     Association of gold with other metals: Pearce, 90b  
     Biologic evolution: Ward (L F), 90b  
     Borderland between crystallography and chemistry: Goldschmidt, 04  
     Cambrian faunas, diffusion and sequence: Matthew (G F), 93  
     Canadian and Scottish geology: Dawson (J W), 85a  
     Canadian geological nomenclature: Ells, 99a  
     Canadian geology: Dawson (J W), 64  
     Catastrophism and evolution: King (C), 77a  
     Century of progress in paleontology: Weller, 99b  
     Climate of Acadia in earliest times: Matthew (G F), 93e  
     Continental problems: Gilbert, 93a  
     Concentration as a geological principle: Russell, 07a  
     Continents and oceans, origin of: Love, 08  
     Contributions of America to geology: Rice (W N), 07  
     Cretaceous system in Canada: Whiteaves, 94  
     Crystalline rocks of the Northwest: Winchell (N H), 84e  
     Darwin and geology: Stevenson, 09  
     Denudation of the two Americas: Reade, 85  
     Development of systematic petrography in nineteenth century: Cross, 02a

## Addresses—Continued.

Distribution of nation's mineral wealth: Smith (G O), 09  
 Dry land in geology: Coleman, 16  
 Early surroundings of life: Lane, 07c  
 Earth genesis: Chamberlin (T C), 18  
 Earthquake forecasts: Gilbert, 09a  
 Earth movements: Van Hise, 98b  
 Earth sciences, relations: Davis (W M), 04  
 Earth-crust movements: Le Conte, 97  
 Earth's crust: Holland, 14  
 Elementary lecture on geology: Ells, 89a  
 Evidence for evolution in the history of extinct Mammalia: Cope, 83zg  
 Evolution as it appears to the paleontologist: Osborn, 07c  
 Evolution of petrological ideas: Teall, 03  
 Evolution with reference to effects of geological changes on animal life: Packard (A S), 98  
 Evolutional geology: Sollas, 00  
 Experiment in geology: Adams (F D), 18  
 Federal Government, relation to the mining industry: Hayes, 06  
 Fossil insects: Cockerell, 17d; Scudder, 90i  
 Future for geologists: Hubbard (G D), 17  
 Genealogy of Vertebrata: Cope, 85a  
 Genetic theories of ore deposits, application to search for local enrichments: Collins (G E), 13  
 Geognosy of the Appalachians: Hunt, 71a  
 Geography, relation to geology: Davis (W M), 12a  
 Geologic bases of mining law: De Kalb, 10  
 Geologic basis for artesian prediction: Darton, 09c  
 Geologic forecast of the future opportunities of our race: Chamberlin (T C), 09b  
 Geologic history, application of biology to: White (C A), 86b  
 Geologic history of myriapods and arachnids: Scudder, 85i  
 Geologic history of North American continent: Hall, 69, 83m; White (C A), 85c  
 Geologic science, relation to education: Shaler, 96a  
 Geologic time: Walcott, 93  
 Geological change and time: Geikie (A), 93  
 Geological progress in Canada: Ells, 90d  
 Geological progress of twenty-five years: Westgate, 12  
 Geological surveys, relations: Branner, 90a; relations to successful mining: Winslow, 91c  
 Geological work in the Southwest: Gould, 17  
 Geology: Kemp, 08; Marbut, 13  
 Geology, relation to mining industry: Lawson, 05  
 Geology and agriculture, relations: McGee, 82b



## Addresses—Continued.

Geology and economics: Kemp, 11  
 Geology and engineering practice: Winslow, 89  
 Geology and revelation: Calvin, 09  
 Geology and the public service: Smith (G O), 17b  
 Geology in education: Salisbury, 18b  
 Geology of government explorations: Emmons (S F), 97a  
 Geology of Nelson and Hayes rivers: Tyrrell, 16  
 Geology of ore deposits: Van Hise, 01c  
 Geophysical research: Day (A L), 11  
 Geophysics, present problems of: Becker, 04a  
 Geospheres: McGee, 98a  
 Glacial drift, inventory: Chamberlin (T C), 86  
 Glacial geology in America: Fairchild, 98  
 Glaciers and glaciation of Alaska: Tarr, 13  
 Great Lakes, history: Leverett, 10a  
 Great Plains, geology: Hay (R), 93b  
 Hawaiian volcano museum, proposed: Jaggar, 16a  
 Hawaiian volcanoes: Jaggar, 13a  
 History and methods of paleontological discovery: Marsh, 79g  
 Ice age in Europe and North America: Geikie (J), 85  
 Igneous rocks, study of: Iddings, 09a  
 Influence of applied geology: Van Hise, 12  
 International Geological Congress: Cook, 88a; work of: Gilbert, 87  
 Introduction and succession of vertebrates: Marsh, 77d  
 Iowa geological survey: Calvin, 09c  
 Isostasy, relations to geodesy, geophysics, and geology: Hayford, 11.  
 Isostasy and radioactivity: Becker, 15  
 Isthmus of Panama and animal life of North and South America: Scott (W B), 16  
 Mammalia, rise in North America: Osborn, 93  
 Mammalian paleontology, ten years' progress: Osborn, 05e, i  
 Man in the Tertiaries: Morse (E S), 84  
 Mathematical theories of the earth: Woodward (R S), 89  
 Mesozoic, North America: White (C A), 89b  
 Metalliferous veins: Kemp, 05c  
 Methods of American geographic investigation: Davis (W M), 08a  
 Methods of the earth sciences: Chamberlin (T C), 04c  
 Microscopical light in geological darkness: Claypole, 98  
 Mineral physiology: Hunt, 82  
 Mineralogical chemistry, advances in: Harrington, 95  
 Mount Mazama, wreck of: Diller, 02b  
 New Brunswick, progress of geological investigation in: Bailey (L W), 90a  
 Niobrara chalk: Calvin, 94b  
 North America and Europe: Penck, 09  
 North American continent, early history: Hitchcock (C H), 83  
 North Atlantic, geologic history: Dawson (J W), 86  
 Ore deposits, present tendencies in the study of: Lindgren, 07c  
 Origin and history of life: Dawson (J W), 75a

## Addresses—Continued.

Origin of hypotheses: Gilbert, 96  
 Origin of mountain ranges: Le Conte, 93  
 Our society [Geological Society of America]: Stevenson, 99  
 Outlook for young men in geology: Bain, 08d  
 Outlook of geologist in America: Walcott, 02a  
 Paleobotany, 1890-1900: Penhallow, 01  
 Paleontological and embryological development: Agassiz (A), 80  
 Paleontological Society: Clarke (J M), 11c  
 Paleontology, present problems: Osborn, 05c; relation to schools and colleges: Clarke (J M), 99e  
 Paleontology as a morphological discipline: Scott (W B), 96b  
 Paleontology of arrested evolution: Ruedemann, 18  
 Petrography and related sciences: Zirkel, 04  
 Petroleum, geological probabilities: Orton, 98  
 Petrology as related to other branches of natural sciences: Iddings, 96b  
 Philosophy of geology and the order of the state: Clarke (J M), 17  
 Physiographic problems: Russell, 04b  
 Physiographical geology of the Rocky Mountain region in Canada: Dawson (G M), 91a  
 Pioneers in Gulf Coastal Plain geology: Smith (E A), 14  
 Plan of development of North America: Dana (J D), 56b  
 Plan of the earth: Gregory (J W), 99  
 Pleistocene geology, New York: Fairchild, 13  
 Pleistocene mollusks, significance: Shimek, 13  
 Pleistocene problem in Iowa: Calvin, 09a  
 Pre-Cambrian of Canada: Dawson (G M), 97a  
 Pre-Cambrian sediments in the Adirondacks: Kemp, 00  
 Primeval flora: Dawson (J W), 69f  
 Problems in the study of coal: Orton, 85a  
 Problems of geology: Van Hise, 04a  
 Progress of American geology: Cook, 88a; Hitchcock (E), 41a  
 Progress of American mineralogy: Brush, 82  
 Progress of geological research in the United States: Rogers (H D), 44  
 Progress of geology: Orton, 85a; 1891-1915: Carney, 16  
 Recent advances in geology: Foster, 70  
 Recent developments in geology: Butler (G M), 12  
 Recent discussions: Dawson (J W), 94b  
 Relation of geology to mining: Hatch, 14  
 Relations and teachings of geology: Fontaine, 79a  
 Relief of our Pacific coast: Diller, 15b  
 Rhythms and geologic time: Gilbert, 00  
 Rocky Mountain region in Canada, geological record: Dawson (G M), 01  
 Science and progress of geology: Silliman, 42  
 Scientific method: Gilbert, 86  
 Scope of paleontology: Williams (H S), 92  
 Seismology, progress and needs: McAdie, 15  
 State geological surveys and practical geography: Carney, 08a  
 State geologist and conservation: Purdue, 17c  
 Stratigraphic geology: Prosser (C S), 06



## Addresses—Continued.

- Studies on fossil fishes during 1907: Dean, 08  
 Surveys of the West: Seudder, 78c  
 Tertiary volcanoes of Absaroka Range: Hague, 99c  
 Theories of ore deposition: Emmons (S F), 04a  
 Training and work of a geologist: Van Hise, 02a  
 Training of a geologist: Branner, 90  
 U. S. Geological Survey and the mining industry: Smith (G O), 07e  
 U. S. Geological Survey, chemical work of: Clarke (F W), 10b  
 Unsolved problems in geology: Dawson (J W), 83  
 Uranium and geology: Joly, 08  
 Variations in Upper Cretaceous stratigraphy: Stanton, 13  
 Vegetation of Carboniferous age: Williamson, 83  
 Vertebrate life of Canada: Lambe, 12  
 Vertebrate paleontology, progress: Osborn, 01e  
 Adirondack Mountains: Kemp, 92f; Miller (W J), 17a. *See also* New York  
 Admiralty Island, Alaska: Wright (C W), 06a  
 Adularia: Winehell (N H), 99h  
 Afton craters, N. Mex.: Lee (W T), 07d  
 Aftonian mammalian fauna: Calvin, 09b, 10, 11  
 Aftonian sands and gravels in western Iowa: Calvin, 05; Shimek, 08b  
 Agarieocrinus, development: Klem, 00  
 Agarophius: True (F W), 07  
 Agassiz, Alexander, biography: Murray, 11  
 Agassiz, Louis, biography: Agassiz (E C), 85; Holder, 93; Marcou, 96; Walcott, 07  
 Agate Spring fossil quarry, Nebr.: Peterson, 06b, 09  
 Age flow and ebb of the Eocene seas: Harris, 18  
 Age of the earth. *See* Earth, age.  
 Agelacrinites. *See* Cystoidea  
 Aggradation and degradation of valleys: Moody (A E), 07  
 Agoniatite limestone fauna, N. Y.: Wilson (J D), 03  
 Agricultural geology: Emmons (E), 45; Holbrook, 51; Kedzie, 77  
 Agriochoerus: Wortman, 95  
 Ajo copper district, Ariz.: Joralemon, 14  
 Alabama.  
   Benton Co.: Currey, 54a  
   Carboniferous coal pebbles: Prouty, 12a  
   Chemical report: Mallet, 58  
   General: Brumby, 39; Cornelius, 19; Haines 72; Hall (B M), 04; Porter (W S), 28  
   Geological survey, reports: Tuomey, 50, 58; Smith (E A), 73, 75, 76, 76a, 79, 81, 83, 88, 90, 92, 96, 02  
   Greene Co.: Withers, 33  
   Greensand, structure: Ehrenberg, 55  
   Jackson antielinal in Clarke Co.: Smith (E A) 06c  
   Soils: Smith (E A), 83; Stubbs, 78  
   Surveys: Smith (E A), 94c  
   Warrior and Tombigbee rivers region: Harper, 10a  
*Economic geology.*  
   Atlanta-Greenville: Campbell (J L), 83  
   Auriferous slate deposits: Mell, 81  
   Barite: McCalley, 95; Watson (T L), 15

## Alabama—Continued.

*Economic geology—Continued.*

- Bauxite: Hayes, 94d, 95d; Judd (E K), 07a; McCalley, 92, 94; Ries, 96b  
 Coosa Valley: Hayes, 95g  
 Warwhoop bank, Cherokee Co.: Brewer, 93a  
 Benton Co.: Currey, 54a  
 Birmingham district: Burchard, 10c; Butts, 10a; McCreath, 87a  
 Birmingham-Macon belt: Spencer (J W), 89  
 Blount Mountain, coal measures: Gibson, 93a  
 Cement materials: Eekel, 03e, 05h, 13; Smith (E A), 03, 04a, b, 05a  
 Clay: Ries, 00; Smith (E A), 92e, 98  
   Birmingham district: Butts, 07b, 10a  
   geologic relations: Smith (E A), 00  
 Coal: Aldrich, 76; Ashburner, 89; Gesner, 76; Hayes, 02b; Hunt, 83b; Jones (A), 34; Lyell, 46d; McCalley, 91, 01; Porter (J B), 87; Powell (G), 58; Rothwell, 74; Schmitz, 84; Smith (E A), 76, 80, 93a  
 Birmingham district: Burchard, 10c; Butts, 06b, 10a  
 Blount Co.: Gibson, 91  
 Blount Mountain: Gibson, 93a  
 Cahaba field: Butts, 07e, 11; Squire, 90; Tuomey, 76  
 Coosa field: Brewer, 93c; Gibson, 95; Prouty, 09, 12; Smith (E A), 76a; Lahausage mine: Evans (A W), 09.  
 Raccoon Mountain field: Gibson, 86  
 Tuscaloosa field: Lyell, 46a  
 Warrior basin: Butts, 05, 06b; Frazer, 91; McCalley, 86, 98, 00; Smith (E A), 79, 80, 81; Pratt mines: Crane, 05  
 Coal Measures, Blount Co.: Gibson, 91  
 Coosa Valley: Anon, 01  
 Copper: Brewer, 97e; Lieber, 55; Weed, 11  
 Dolomite, Birmingham district: Butts, 07; Meissner, 94  
   Montevallo, Shelby Co.: Butts, 11c.  
 Fluxing rocks: McCalley, 97b  
 Gadsden quadrangle: Hayes, 96  
 General: Brewer, 95b, 97a; Schmitz, 84; Smith (E A), 75, 76, 78, 86a, 92a; Tuomey, 50, 58  
 Glass sands: Burchard, 07d  
 Gold: Brewer, 93b, 94, 96a, b, c, 97, 97f; Lieber, 55; McCaskey, 08; Phillips (W B), 92, 97, 97a; Pratt, 02h; Smith (E A), 96a  
 Arbacochee district: Brewer, 95a  
 Chilton and Elmore cos.: Phillips (W B), 97b  
 Clay Co.: Brewer, 97d  
 Hog Mountain: Aldrich (jr), 08  
 Talladega Co., Gold Log mine: Bastin, 16a  
 Granites: Watson, 10  
 Iron: Chauvenet, 86; Eckel, 06b; Gesner, 76; Hunt, 83b; Phillips (W B), 96, 12; Porter (J B), 87; Rothwell, 74; Willis, 86a  
 Baker Hill, Cherokee Co.: Brewer, 93  
 Birmingham district: Brainerd, 89; Burchard, 07, 08, 09a, 10c; Butts, 10a; Gibson, 93  
 Brookwood quadrangle: Burchard, 05  
 Chattanooga district: Burehard, 09; Higgins (E), 09  
 Clinton ores: Burehard, 07f, 08, 08b, 09, 09a; Eckel, 06b



## Alabama—Continued.

*Economic geology—Continued.*

- Iron: hematites: McCalley, 97a; Birmingham district: Singewald, 17  
 Jefferson Co.: Castleman, 99  
 Leeds: Phillips (W B), 98  
 limonites: McCalley, 96a  
 Lookout Mountain: Bowron, 05  
 Montevallo-Columbiana region: Butts, 11a  
 northeastern Ala.: Burchard, 14a  
 Russellville district: Burchard, 07g; Sawyer, 14  
 Talladega Co.: Smith (P S), 07b  
 Kaolin: Mell, 82  
 Limestone, Birmingham district: Butts, 07, 10a; Meissner, 94  
 Manganese, Birmingham region: Gibson, 93  
 Marble: Prouty, 16, 16a  
   Cahaba River: Byrne, 02  
   Calera, Shelby Co.: Butts, 11b  
   crystalline: Prouty, 15  
 Marl: Smith (E A), 92b, 94a, 96c  
 Mineral resources: Abele, 12; Haines, 72; McCalley, 86a; Smith (E A), 84, 96b, 04, 15; northeastern Ala.: Brewer, 96  
 Mobile Co.: Stelle, 88  
 Mufrees Valley: Gibson, 93; Phillips (W B), 93a  
 Natural gas: Byrne, 10; McCalley, 91a  
   Fayette field: Munn, 11c, 12c  
   Northern Ala.: McCalley, 86a  
 Oil and gas possibilities: Hager, 18; Smith (E A), 17  
 Oil and gas prospects: Byrne, 10  
 Petroleum: Fuller, 17; McCalley, 91a  
 Phosphate: Smith (E A), 92b, 94a, 96c  
   Cretaceous: Smith (E A), 84a, b  
   Tertiary: Smith (E A), 85  
 Portland cement: Eckel, 04e; Smith (E A), 95  
 Road materials: Prouty, 11  
 Roup's and Jones' valleys: Smith (E A), 76a  
 Sand-lime brickmaking: Butts, 07a  
 Soapstone: Mell, 82  
 Stevenson quadrangle: Hayes, 95  
 Stone: Smith (E A), 98a  
 Tennessee basin: McCalley, 96; Smith (E A), 79  
 Tombigbee Valley: Eckel, 05h  
 Warrior coal basin, map: McCalley, 98

*Historical geology.*

- Appomattox formation: McGee, 90  
 Archean: Smith (E A), 75  
 Atlanta-Greenville: Campbell (J L), 83  
 Baldwin Co.: Bigelow, 46  
 Birmingham district: Burchard, 10c  
 Birmingham quadrangle: Butts, 10a  
 Birmingham-Macon belt: Spencer (J W), 89  
 Black Warrior coal field: Smith (E A), 80  
 Blount Mountain, Coal Measures: Gibson, 93a  
 Brown's Valley: Smith (E A), 79  
 Cahaba coal field: Butts, 11; Smith (E A), 90a; Squire, 90; map: Smith (E A), 05  
 Carboniferous, Appalachian basin: Stevenson, 04  
 Chattahoochee River section: Langdon, 91  
 Chester series: Ulrich, 17  
 Choctaw Bluff: Winchell (A), 56  
 Choctaw Co.: Lucas (F A), 00b  
 Citronelle formation: Matson, 16

## Alabama—Continued.

*Historical geology—Continued.*

- Claiborne beds: Aldrich, 85; Conrad, 34; Lea, 33; Lyell, 47c; Mell, 80; Meyer (O), 85; Smith (E A), 85b  
 Clarke Co., Eocene: Heilprin, 81  
 Clinton formation: Burchard, 08b  
 Coal fields: Lyell, 46d  
 Coal Measures, Blount Co.: Gibson, 91; plateau region: McCalley, 91  
 Coastal plain formations: Clark (W B), 09a  
   Smith (E A), 94  
 Coosa coal field: Gibson, 95; Prouty, 12; Smith (E A), 76a  
 Coosa Valley: Hayes, 94e; Anon, 01  
 Cretaceous: Smith (E A), 92b, 03  
 Cretaceous and Tertiary: Langdon, 91a; Thornton, 58; east of Alabama River: Langdon, 94  
 Cretaceous-Eocene contact: Stephenson, 15; Tombigbee River: Smith (E A), 10a  
 Crystalline rocks, eastern Ala.: Hitchcock (C H), 85a  
 Dolomite formations: Butts, 12  
 Eocene: Lyell, 46; Claiborne: Lyell, 47c  
 Fayette gas field: Munn, 11c, 12c  
 Gadsden quadrangle: Hayes, 96  
 General: Brumby, 39; Hager, 18; Hale (C S), 48; Kain, 45; Schmitz, 84; Shepard, 33; Smith (E A), 75, 76, 78, 92a, 00; Tuomey, 50, 58; Winchell (A), 57  
 Geological map, with chart: Smith (E A), 94b  
 Gnathodon beds, Mobile: Hale (C S), 51  
 Gold belt: Phillips (W B), 92; Smith (E A), 96a  
 Grand Gulf formation: Johnson (L C), 89  
 Hatchetigbee anticline: Hopkins (O B), 17b  
 Jackson and Vicksburg deposits, correlation: Cooke (C W), 18a  
 Lafayette formation: Johnson (L C), 94  
 Lignitic stage: Harris, 97  
 Middleton formation: Safford, 92, a, b  
 Midway formation: Aldrich, 94a  
 Midway stage: Harris, 96  
 Miocene: Johnson (L C), 93a  
 Mobile Co.: Stelle, 88  
 Mon Louis Island, Mobile Bay: Langdon, 90  
 Mufrees Valley: Gibson, 93; Phillips (W B), 93a  
 Northeastern Ala.: Hayes, 92  
 Northern Ala.: McCalley, 81  
 Nummulite limestone, age: Lyell, 47c  
 Oligocene: Maury, 02  
 Paleozoic: Smith (E A), 91  
 Perry Co.: Smith (E A), 84a, b  
 Post-Eocene formations: Smith (E A), 94d 06a  
 Ripley group: Johnson (L C), 84  
 Rome quadrangle: Hayes, 02  
 Roup's and Jones's valleys: Smith (E A), 76a  
 St. Stephens limestone overlap: Smith (E A), 06b  
 Stevenson quadrangle: Hayes, 95  
 Tennessee basin: Smith (E A), 79  
 Tennessee Valley: McCalley, 96  
 Tertiary: Aldrich, 85; Heilprin, 81a, 84a; Hilgard, 67; Langdon, 86; Smith (E A), 86, 92b  
 Claiborne: Lyell, 46e  
 correlation: Vaughan, 18d  
 limits: Winchell (A), 84a



## Alabama—Continued.

*Historical geology*—Continued.

- Tertiary and Cretaceous: Smith (E A), 87  
 Tombigbee Valley: Eckel, 05h  
 Tuscaloosa coal field: Lyell, 46a  
 Tuscaloosa formation: Smith (E A), 92e; delta character: Berry, 17d  
 Warrior coal basin: McCalley, 86, 00; Smith (E A), 79, 81; map: McCalley, 98  
 Warrior River region: Smith (E A), 81

*Mineralogy*.

- Evansite: Catlett, 11; Grasty, 12; Schaller, 07a  
 Halloysite: Vander Meulen, 17  
 Meteorite: Jackson, 45b  
 Auburn, Macon Co.: Shepard, 69  
 Chulafinnee, Cleberne Co.: Hidden, 80  
 Claiborne: Hayes (A A), 45; Jackson, 38c  
 Danville: Smith (J L), 70  
 De Sotville, Choctaw Co.: Brezina, 04a  
 Felix, Perry Co.: Merrill (G P), 01a  
 Franklin Co.: Brush, 69b  
 Leighton: Farrington, 02  
 Lime Creek, Claiborne: Cohen, 92  
 Selma: Hovey, 07d; Merrill (G P), 07  
 Summit, Blount Co.: Kunz, 90  
 Tombigbee River: Foote (W M), 99  
 Walker Co.: Cohen, 98a; Troost, 45  
 Schrötterite, Cherokee Co.: Mallet, 58a  
 Tantalite, Coosa Co.: Smith (J L), 78  
 Tourmaline, Micaville, Randolph Co.: Van Horn (F R), 18

*Paleontology*.

- Alabamornis gigantea: Abel, 06  
 Basilosaurus: Carus, 47; Harlan, 35d; Koch (A C), 45, 45a  
 Bourgueticrinus alabamensis, Ripley group: De Loriol, 82  
 Calyptraphorus: Conrad, 57b  
 Cambrian trilobites: Walcott, 10  
 Cancellaria, Eocene: Aldrich, 97a; Ripley group: Miller (S A), 82b  
 Cassidulus, Eufala: Gabb, 60h  
 Ceratites: Harper, 56  
 Citronelle flora: Berry, 16d  
 Claiborne fauna: Harris, 95; Heilprin, 79; Lea 33, 41; Mell, 80  
 Coal Measures plants: Lesquereux, 76f  
 Coastal Plain: Smith (E A), 94  
 Cretaceous: Conrad, 60b; Gabb, 61d  
 Bauhinia: Berry, 10g  
 Dewalquea: Berry, 10c  
 Mollusca: Gabb, 61e; Tuomey, 54  
 Cretaceous and Tertiary, lists: Tuomey 58a  
 Cristellaria, Ripley group: Schlumberger, 82  
 Diatomaceae, Montgomery: Cunningham, 94  
 Echinodermata, Eocene, Washington Co.: Morton, 46a  
 Echinids, Tertiary: Stefanini, 12  
 Eocene: Aldrich, 07a, 08a, 11; Conrad, 60b; Cossmann, 93; Gregorio, 90; Meyer (O), 86, 87a  
 Claiborne: Aldrich, 08; Wheeler (H E), 10  
 Mollusca: Aldrich, 98, 10a; Conrad, 65f, h; Meyer (O), 87; Whitfield, 65; Clarke Co.: Heilprin, 81  
 Eschara, Eocene: Lea, 52  
 Ficus, Tuscaloosa formation: Berry, 05a

## Alabama—Continued.

*Paleontology*—Continued.

- Fish otoliths: Koken, 88  
 Foraminifera, Alabama chalk: Cunningham, 94b  
 Hydrarchos, Washington Co.: Lister, 46  
 Leaf impressions, Eocene: Langdon, 93  
 Medusae, Coosa Valley: Walcott, 96b  
 Microzoa, Tertiary, southern Ala.: Cunningham, 94a  
 Midway formation: Aldrich, 94a  
 Mollusca: Conrad, 71b; Wood's Bluff: Aldrich, 03b  
 Mosasauroid reptile from Cretaceous: Gilmore, 12  
 Nautilus alabamensis: Geinitz, 87  
 Orbitoides mantelli: Lyell, 47c  
 Oryctomya, Claiborne: Dall, 98c  
 Ostrea, Eocene: Aldrich, 04  
 Plantae, Gadsden: Lesquereux, 88b; Tuscaloosa coal field: Bunbury, 46; Lyell, 46c  
 Pleistocene flora: Berry, 07d, 10h  
 Prionastraea vauhani, Eocene: Gregory (J W), 99a; Vaughan, 01a  
 Pterosphenus, Eocene: Lucas (F A), 98  
 Reptilia, Pickens Co.: Leidy, 70b  
 Soluriidae, Eocene: Aldrich, 95a  
 Tertiary: Aldrich, 86, 86a; Langdon, 86  
 Claiborne: Conrad, 34a  
 Mollusca: Aldrich, 85a, 87, 95, 03; Conrad, 44  
 Tortoise, Choctaw Co.: Hay (O P), 99  
 Trapa: Berry, 14c  
 Tuscaloosa flora: Berry, 13  
 Zeuglodon: Buckley, 46; Gidley, 13b; Koch, 51; Lucas (F A), 00b; Müller, 47a, 49; Anon, 45a  
 discovery: Koch, 51a  
 Washington Co.: Wyman, 50f  
 Zygodon: Buckley, 43

*Petrology*.

- Crystalline rocks: Hawes, 96  
 Metamorphic rocks, eastern Ala.: Brooks, 96  
 Northeastern Ala.: Clements, 96

*Physical geology*.

- Earthquake, October 18, 1916: Finch (R H), 16a; Hopkins (O B), 16a  
 Northeastern Ala.: Hayes, 92  
 Solution sinks in quartzite formation, Coldwater Mountain: Hayes, 00c  
 Structural features: Smith (E A), 17

*Physiographic geology*.

- Camp McClellan, Anniston quadrangle: Matthes, 18  
 Chattanooga district: Hayes 99e  
 General: Smith (E A), 84c; Tuomey, 58  
 Gulf coastal plains: Sutherland, 08  
 Northeastern Ala.: Hayes, 92  
 Prairies: McGuire, 34

*Underground water*.

- Artesian wells: Winchell (A), 57a  
 General: Smith (E A), 04c, 05b, 07  
 Alabamornis: Abel, 06; Lucas, 08  
 Alabaster, Tecali, Mexico: Bárcena, 74a  
 Aladdin folio (no. 128): Darton, 05b  
 Alaska.  
 Alaska Peninsula: Atwood, 09b, 11  
 Alatna-Noatak region: Smith (P S), 12a  
 Aleutian Islands: Dall, 78a



## Alaska—Continued.

- Bogosloff Island: Dall, 84a  
 Bonnifield district: Prindle, 11  
 Broad Pass region: Moffit, 14a  
 Cape Nome gold district: Schrader, 00c  
 Chandlar and Koyukuk rivers: Schrader, 00b  
 Chistochina district: Moffit, 11  
 Circle to Fort Hamlin: Stone (R W), 06a  
 Climatic conditions at Nome during the Pliocene: Dall, 07c  
 Coast: Blake (T A), 69; Dawson, (G M), 94  
 Yakutat to Alsek River: Blackwelder, 07a  
 Copper River country: Abercrombie, 04; Schrader, 00a, 01  
 Cosna-Nowitna region: Eakin, 16a  
 Explorations: Russell (I C), 91a  
 General: Blake (T A), 68, 69; Buckland, 39; Dall, 68, 69, 69a, 81; Grewingk, 50; Jannettaz, 75  
 Geologic survey, progress: Brooks, 06  
 Geology and geography: Brooks, 07; Rühl, 09  
 Geology of boundary between Porcupine and Yukon rivers: Cairnes, 12a  
 Kantishna district: Prindle, 11  
 Kotzebue Sound region: Dall, 73  
 Koyukuk-Kobuk region: Smith (P S), 11b  
 Mount McKinley region: Brooks, 11  
 Norton Bay region: Mendenhall, 01  
 Paleoclimatology: Blackwelder, 18  
 Popof Island: Palache, 04b  
 Porcupine to Arctic boundary: Maddren, 12a  
 Prince William Sound: Grant (U S), 10b; Schrader, 00a; Stevens (B), 09a  
 Publications, recent: Brooks, 06b  
 Pyramid Harbor to Fortymile River: Brooks, 00b  
 Railway routes: Brooks, 12a  
 Resurrection Bay to Tanana River: Mendenhall, 00  
 Seward Peninsula: Smith (P S), 13c  
 Southwestern Alaska: Spurr, 00  
 Stepovak Bay region: Palache, 04b  
 Stickeen River: Blake (W P), 68  
 Susitna basin: Eldridge, 00; Moffit, 11  
 Tanana basin: Brooks, 99, 00  
 Tertiary land connection between Asia and North America: Knopf, 10a  
 Unga Island: Palache, 04b  
 Volcanic ashes from Kodiak: Fry, 12  
 Volcanic sand, Unalaska: Diller, 84c, g  
 Water powers: Ellsworth (C E), 14; Hoyt, 10  
 White River basin: Brooks, 99, 00  
 Yakutat Bay region: Tarr (R S), 09a  
 Yentna district: Capps, 13  
 Yukon River region: Hayes, 97a; Hollick, 04d; late Tertiary and Quaternary history: Harrington (G L), 18a  
 Yukon-Tanana region: Prindle, 08
- Economic geology.*  
 Admiralty Island: Wright (C W), 06a  
 Alaska Peninsula: Atwood, 11  
 Antimony: Brooks, 16a; of Kantishna region: Capps, 17  
 Anvik-Andreafski region: Harrington (G L), 17, 18  
 Barite, Wrangell: Burchard, 14c  
 Berners Bay region: Knopf, 11

## Alaska—Continued.

*Economic geology—Continued.*

- Bonnifield and Kantishna regions: Prindle, 07  
 Bonnifield region: Capps, 11, 12  
 Bremner River district: Moffit, 12a  
 Broad Pass region: Moffit, 15  
 Building materials: Wright (C W), 08a  
 Cape Nome region: Bogdanovich, 01; Brooks, 01; Murray, 99; Schrader, 00  
 Chisana district: Brooks, 14; Cairnes, 13d, 14a  
 Chisana-White River district: Capps, 15c, 16  
 Chistochina district: Moffit, 12  
 Chitina Valley: Moffit, 13a, 16, 18  
 Circle district: Brooks, 07b; Ellsworth, 12; Prindle, 06a  
 Coal: Brooks, 02, 05e, 06a, 10, 11b, c, 13a; Crane, 14; Dall, 96; Martin (G C), 07; Ritter, 06b; U S, Dp Interior, 16  
 Admiralty Island: Wright (C W), 06a  
 Alaska Peninsula: Atwood, 11  
 Bering River field: Crane, 13, 13c; Fisher (C A), 14; Kay, 11, 11a; Martin (G C), 04, 05a, e, 06; Storm, 10a  
 Bonnifield and Kantishna region: Prindle, 07  
 Bonnifield region: Capps, 11, 12  
 Cape Lisburne: Collier, 04b, 05b, 06  
 Chignik Bay: Crane (W R), 15a  
 Circle district: Brooks, 07b; Prindle, 13b  
 Controller Bay field: Evans (G W), 10; Martin (G C), 08  
 Cook Inlet: Kirsopp, 03; Crane (W R), 14a, 15  
 Fairhaven precinct: Henshaw, 09  
 Herendeen coal field: Paige, 06  
 Kachemak Bay field: Crane (W R), 14a, 15; Parks (G A), 15; Stone (R W), 06  
 Kantishna region: Capps, 17  
 Kayak field: Stoess, 03  
 Kodiak Island: Martin (G C), 13  
 Matanuska field: Crane, 13d, e; Griffith, 06a; Martin (G C), 06a, b, 11, 12b, 14  
 Mount McKinley region: Brooks, 11  
 Nabesna-White River district: Moffit, 10a  
 Noatak-Kobuk region: Smith (P S), 13a  
 problems: Fisher, 11  
 Seward Peninsula and Norton Bay-Nulato region: Smith (P S), 11c  
 southeastern Alaska: Wright (C W), 06  
 southwestern Alaska: Atwood, 09a; Spurr, 00; Stone (R W), 05c  
 Talkeetna basin: Paige, 07a, b  
 utilization: Brooks, 10  
 Yakutat Bay region: Tarr, 06, 09a  
 Yukon region: Collier, 03a, b; Prindle, 06; Spurr, 98a  
 Copper: Brooks, 06a, 11a; Schrader, 00a; Weed, 06  
 Alaska Peninsula: Atwood, 11  
 Big Bonanza deposits: Thompson (A P), 13; Tolman, 16a  
 Chisana district: Brooks, 14  
 Chistochina, and Valdez Creek regions: Moffit, 09  
 Chitina district: Jacobs, 10a; Mendenhall, 03e; Moffit, 10, 12b, 13a; Storm, 10b  
 Clark lake region: Martin (G C), 10a  
 Copper Mountain: Wright (C W), 15



## Alaska—Continued.

*Economic geology—Continued.*

Copper: Copper River district: Brewer (W M), 08; Keller, 08; Mendenhall, 05; Moffit 08a, 17; Schrader, 01

Ellamar district: Capps, 13a, 15a

Hanagita-Bremner region: Moffit, 14

Iliamna region: Martin (G C), 10a, 12a

Kasaan Peninsula: Wright (C W), 08b, c, 15

Kenai Peninsula: Grant (U S), 09b, 10a

Kennicott Bonanza mine: Storm, 10

Ketchikan and Wrangell districts: Wright (F E), 08

Ketchikan region: Smith (P S), 14

Kotsina-Chitina region: Moffit, 09, 09b

Kotsina-Kuskulana district: Mertie, 15; Moffit, 15a

Latouche and Knight Island districts, Prince William Sound: Johnson (B L), 17a

Latouche Island: Lincoln, 09; Stevens (B), 03

Matanuska and Talkeetna basins: Paige, 07a, b

Matanuska Valley: Martin (G C), 14

Mount Wrangell district: Mendenhall, 03, 03b

Nabesna-White River district: Moffit, 09a, 10a

Nizina district: Moffit, 11a

Noatak-Kobuk region: Smith (P S), 13a

Norton Bay-Nulato region: Smith (P S), 11c

Port Valdez district: Johnson (B L), 15a

Prince of Wales Island: Scott (W A), 09

Prince William Sound: Grant (U S), 06c, 09a, 10, 10b, c; Johnson (B L), 15, 17; McCormick, 09; Moffit, 08; Stevens (B), 09a

Russian Mountains: Maddren, 15

Seward Peninsula: Smith (P S), 08, 11c

Shungnak region: Smith (P S), 11

southeastern Alaska: Chapin, 16; Knopf, 11a; Wright (C W), 07, 08, 09; Wright (F E), 06e

Tanana-Nabesna region: Brooks, 00a

Taral district: Moffit, 12a

White River region: Brooks, 00a; Knopf, 10; Lewington, 09

Wrangell Mountains: Abercrombie, 04

Copper River district: Brewer (W M), 08, 08a; Keller, 08; Mendenhall, 05; Moffit, 08a, 17; Schrader, 00a, 01

Douglas Island, Treadwell deposits: Kinzie, 04; Spencer (A C), 05b

Eagle River region: Knopf, 11b, 12

Ellamar district: Capps, 13a, 15a

Fairbanks district: Eakin, 15b; Ellsworth, 12; Mertie, 17a; Prindle, 13

Fairhaven precinct: Henshaw, 09

Fort Hamlin to Kotzebue Sound: Mendenhall, 02

Fortymile quadrangle: Prindle, 09

General: Blake (T A), 69; Brooks, 05, 09b; Eldridge, 99; Emmons (S F), 98a

Gold: Brooks, 03, 04, 05b, 06a, 11a, 15; Dunn, 97; Emmons (S F), 98a; Hutchins, 08; Kolderup, 01; Penrose, 03; Rickard (T A), 09; Wilson (E B), 06

Admiralty Island: Wright (C W), 06a

Alaska Peninsula: Atwood, 11

## Alaska—Continued.

*Economic geology—Continued.*

Gold: Alluvial deposits: Purington, 05

Anvik-Andreafski region: Harrington (G L), 17, 18

Berners Bay region: Knopf, 11

Birch Creek region: Prindle, 05

Bonnifield region: Capps, 11, 12; Prindle, 07

Bremner River district: Moffit, 12a

Cape Yaktag: Martin (G C), 05b

Chisana district: Brooks, 14; Cairnes, 13d, 14a

Chisana-White River district; Capps, 15c, 16

Chistochina field: Mendenhall, 03a

Chitina district: Moffit, 10, 12b, 13a

Circle district: Brooks, 07b; Ellsworth, 12; Prindle, 13b

Clark Lake region: Martin (G C), 10a

Copper River region: Mendenhall, 05; Moffit 08a; distribution of deposits: Becker, 95b

Douglas Island: Spencer (A C), 05b

Eagle River region: Knopf, 11b; 12

Ellamar district: Capps, 13a

Fairbanks district: Chapin, 14a; Eakin, 15b; Ellsworth, 12; Mertie, 17a; Prindle, 04, 05, 09a, 10a, 13; Smith (P S), 13b, f

Fairhaven precinct: Henshaw, 09

Fortymile region: Brooks, 00a; Prindle, 05, 08b, 09

Glenn Creek district: Collier, 03

Gold Hill district placers: Maddren, 09a, 10

Haines district: Scott (W A), 09a

Hanagita-Bremner region: Moffit, 14

Hot Springs district: Eakin, 12, 15c

Iditarod-Ruby region: Eakin, 14

Iliamna region: Martin (G C), 10a, 12a

Innoko, Ruby Creek, and Gold Hill districts: Maddren, 10

Innoko district placers: Maddren, 09b, 10

Innoko-Itarod region; Eakin, 13b; Maddren, 11

Iron Creek region: Smith (P S), 07a, 09a

Juneau district: Eakin, 15a, 17; Hyder, 15; Spencer (A C), 04a, 06a

Kantishna region: Prindle, 07

Kenai Peninsula: Grant (U S), 09b, 10a; Seward-Sunrise region: Johnson (B L), 12

Ketchikan and Wrangell districts: Wright (F E), 08

Ketchikan region: Smith (P S), 14

Klondike region: Everette, 07

Kodiak and neighboring islands: Martin (G C), 13

Kotsina-Chitina, Chistochina, and Valdez Creek regions: Moffit, 09

Kotsina-Kuskulana district: Moffit, 15a

Kotzebue district: Moffit, 04

Kougarok region: Brooks, 07a

Koyukuk-Chandalar region: Maddren, 10a, 13

Kuskokwim region: Maddren, 15

Lake Clark-Iditarod region: Smith (P S), 15a  
lode mining: Wright (C W), 07, 08; Wright (F E), 06e

McKinley Lake district: Chapin, 13

Matanuska and Nelchina valleys: Martin (G C), 14



## Alaska—Continued.

*Economic geology*—Continued.

- Gold: Matanuska and Talkeetna basins: Paige, 07a, b  
 Matanuska field: Martin (G C), 06b  
 Mount McKinley region: Brooks, 11  
 Mount Wrangell district: Mendenhall, 03  
 Mulchatna placers: Katz, 10  
 Nabesna-White River district: Moffit, 09a, 10a  
 Nelchina-Susitna region: Chapin, 15, 18  
 Nenana region: Maddren, 17  
 Nizina placer district: Moffit 09b, 11a  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome and Fairbanks regions: Lincoln, 10  
 Nome and Grand Central quadrangles: Moffit, 13  
 Nome region: Bogdanovich 01: Brooks, 01, 01d; Halla, 07; Hutchins, 07c; Moffit, 07; Queneau, 02a; Rickard (F), 01; Schrader, 00, 01a; Weber, 00, Yale, 00  
 Norton Bay-Nulato region: Smith (P S), 11c  
 Nulato-Council region: Smith (P S), 10a  
 Porcupine district: Brooks, 00a; Eakin, 17a; Wright (C W), 04, 04a  
 Port Valley district: Johnson (B L), 15a  
 Port Wells district: Johnson (B L), 14  
 Prince William Sound: Grant (U S), 06d, 09, 10, 10b; Johnson (B L), 15, 17  
 Rampart region: Eakin, 12, 13; Hess, 08; Prindle, 05a, 06b  
 Ruby district: Eakin, 13a, 14a; Maddren, 09, 10, 12  
 Ruby-Kuskokwim region: Mertie, 16  
 Seward Peninsula: Chapin, 14c, d; Collier, 08a; Eakin, 15e; Henshaw, 10; Mertie, 17c; Moffit, 05, 06a; Smith (P S), 08, 09, 11c, 12b, 13c  
 Seward-Sunrise region: Johnson (B L), 12  
 Shumagin Islands: Martin (G C), 05c  
 Shungnak region: Smith (P S), 11  
 Shushana district: Ellis, 15  
 Sitka district: Knopf, 12a  
 Solomon and Casadepaga quadrangles: Smith (P S), 10  
 Solomon and Niukluk River basins: Smith (P S), 07  
 southeastern Alaska: Chapin, 16; Furman, 01, Knopf, 11a; Wright (C W), 07, 08, 09; Wright (F E), 06e  
 southern Alaska: Becker, 98  
 southwestern Alaska: Atwood, 09a; Spur, 00  
 Squirrel River placers: Smith (P S), 11a  
 Susitna and Chistochina districts: Moffit, 11  
 Tickel district: Moffit, 17  
 Tolovana district: Brooks, 16; Mertie, 17  
 Treadwell district: Hershey, 11  
 Treadwell mine, Douglas Island: Adams (F D), 89; Dawson (G M), 89c  
 Turnagain Arm fields: Moffit, 05a, 06  
 Turnagain-Knik region: Capps, 16a  
 Unalaska Island: Collier, 05  
 Unga and Douglas islands: Lincoln, 10  
 Valdez district: Brooks, 12b; Moffit, 14b; Storm, 12  
 vein mining: Purington, 06  
 Willow Creek district: Capps, 14, 15b, 16b; Katz, 11; Smith (S S), 13

## Alaska—Continued.

*Economic geology*—Continued.

- Gold: Woodchopper and Fourth of July Creeks: Prindle, 12.  
 Yakataga beach: Thompson (A G), 15  
 Yakutat Bay region: Stanley-Brown, 91a; Tarr (R S), 09a  
 Yentna district: Capps, 12a, 13  
 Yukon region: Prindle, 06, 06c; Spurr, 96, 98a  
 Yukon-Koyukuk region: Eakin, 14b, 16  
 Yukon-Tanana region: Chapin, 14b; Ellsworth, 10, 11; Prindle, 05, 08, 08a  
 Grand Central quadrangle: Moffit, 13  
 Granite, southeastern Alaska: Wright (C W), 06, 07a, 08a  
 Graphite, Seward Peninsula: Smith (P S), 08  
 Gypsum, Sitka district: Knopf, 12a; southeastern Alaska: Wright (C W), 06, 07a, 08a  
 Hanagita-Bremner region: Moffit, 14  
 Hot Springs district: Eakin, 15c  
 Iditarod-Ruby region: Eakin, 14  
 Iliamna and Clark lakes region: Martin (G C), 10a  
 Iliamna region: Martin (G C), 12a  
 Innoko-Iditarod region: Eakin, 13b  
 Iron: Whittier, 17  
     Haines: Knopf, 10c  
     Kenai Peninsula: Grant (U S), 10a  
     Matanuska field: Martin (G C), 06b  
     Nome district: Eakin, 15d  
 Iron Creek: Smith (P S), 06a, 09a  
 Juneau region: Eakin, 15a; Hyder, 15  
 Kantishna region: Capps, 17  
 Kenai Peninsula: Brewer (W M), 12; Grant (U S), 09b; Martin (G C), 15; southern part: Grant (U S), 10a  
 Ketchikan and Wrangell mining districts: Wright (F E), 08  
 Ketchikan district: Brooks, 02a; Chapin, 17; Courtis, 00; Smith (P S), 14  
 Klondike region: Everette, 07  
 Kodiak and neighboring islands: Martin (G C), 13  
 Kotsina-Chitina region: Moffit, 09b  
 Kotsina-Chitina, Chistochina, and Valdez Creek regions: Moffit, 09  
 Kotsina-Kuskulana district: Mertie, 15; 15a  
 Kougarok region: Brooks, 07a  
 Koyukuk-Chandalar region: Maddren, 13  
 Kuskokwim region: Maddren, 15  
 Lake Clark-central Kuskokwim region: Smith (P S), 17  
 Lake Clark-Iditarod region: Smith (P S), 15a, 16a  
 Lead, Nulato-Council region: Smith (P S), 10a  
 Seward Peninsula and Norton Bay-Nulato region: Smith (P S), 11c  
 Limestone, southeastern Alaska: Wright (C W), 06  
 Lost River and Brooks Mountain region: Knopf, 08a  
 McKinley Lake district: Chapin, 13  
 Marble: Rathbun, 06  
 Juneau, Skagway, and Sitka districts: Burchard, 14b



## Alaska—Continued.

*Economic geology*—Continued.

Marble: Ketchikan and Wrangell districts: Burchard, 13  
southeastern Alaska: Wright (C W), 06, 07a, 08a  
Matanuska and Nelchina valleys: Martin (G C), 14  
Matanuska and Talkeetna basins: Paige, 07a, b  
Matanuska Valley: Martin (G C), 12b  
Metalliferous lodes, geologic features: Brooks, 11a  
Mica, Seward Peninsula: Smith (P S), 08  
Mineral resources: Brooks, 05, 05d, 06a, 06d, 08, 09, 09a; Emmons (S F), 98b; Smith, (S S), 17; southeastern Alaska: Brewer (W M), 03a; Garside, 93  
Mount St. Elias: Novarese, 00  
Mount Wrangell district: Mendenhall, 03  
Nabesna-White River district: Moffit, 09a, 10a  
Nelchina Valley: Martin (G C), 14  
Nelchina-Susitna region: Chapin, 18  
Nenana region: Overbeck, 17  
Nizina district: Moffit, 11a  
Noatak-Kobuk region: Smith (P S), 13a  
Nome quadrangle: Moffit, 13  
Nonmetallic products: Wright (C W), 06, 07a  
Northern Alaska: Schrader, 04  
Norton Bay-Nulato region: Smith (P S), 11c  
Nulato-Council region: Smith (P S), 10a  
Ore bodies in glaciated regions: Wright (C W), 11  
Ore deposits: Henning, 11  
Peat: Davis (C A), 09, 10b  
Petroleum: Brooks, 15a; Höfer, 10; Martin (G C), 04, 04a, 05d  
Alaska Peninsula: Atwood, 11  
Controller Bay: Martin (G C), 07a, 08  
Iliamna region: Martin (G C), 12a  
Katalla, field: Prosser (W T), 11; Thompson (A), 12  
Kayak field: Stoess, 03  
Pacific coast: Martin (G C), 05a  
Yakutat Bay: Tarr, 06  
Port Valdez district: Johnson (B L), 15a  
Prince of Wales Island: Thomae, 02  
Prince William Sound: Grant (U S), 06c, 10, 10b, 12; Johnson (B L), 14a, 15, 16a, 17; Schrader, 00a  
Quicksilver, Kuskokwim region: Smith (P S), 15b  
Rampart and Hot Springs regions: Eakin, 12  
Rampart quadrangle: Eakin, 13  
Resurrection Bay to Tanana River: Mendenhall, 00  
Ruby district: Eakin, 13a  
Ruby-Kuskokwim region: Mertie, 16  
Seward Peninsula: Henshaw, 10; Mertie, 17b; Smith (P S), 08, 09, 12b; northwestern part: Collier, 02; southeastern part: Smith (P S), 11c  
Shungnak region, Kobuk Valley: Smith (P S), 11  
Shushana district: Ellis, 15  
Silver: Brooks, 06a  
Iliamna region: Martin (G C), 12a  
Nulato-Council region: Smith (P S), 10a

## Alaska—Continued.

*Economic geology*—Continued.

Silver: Seward Peninsula and Norton Bay-Nulato region: Smith (P S), 11c  
Sitka district: Knopf, 12a  
Solomon and Casadepaga quadrangles, Seward Peninsula: Smith (P S), 10  
Solomon and Niukluk River basins: Smith (P S), 07  
southeastern Alaska: Wright (C W), 07  
Southeastern Alaska: Chapin, 16; Knopf, 10b, 11a; Spencer (A C), 05c; Wright (F E), 05b  
Southwestern Alaska: Atwood, 09a; Wright (C W), 09  
Sulphur, Makushin deposits, Unalaska: Lawton, 09  
Talkeetna basin: Paige, 07a, b  
Taral River district: Moffit, 12a  
Tin: Bell (R N), 03; Brooks, 03a; Collier, 05a; Eakin, 15  
Birch Creek district: Johnson (B L), 10  
Cape Prince of Wales: Fay, 07  
Seward Peninsula: Chapin, 14d; Knopf, 08, 08b, 09; Smith (P S), 12b  
York region: Brooks, 01a, c; Collier, 03c, 04, 04a; Hess, 06; Rickard (E), 03  
Tolovana district: Brooks, 16  
Treadwell deposits, Douglas Island: Dawson (G M), 89c; Hershey, 11; Palache, 04a; Spencer (A C), 05  
Tungsten near Fairbanks: Bateman, 18  
Turnagain-Knik region: Capps, 16a  
Valdez Creek: Moffit, 11b, 12, 14b; Storm, 12  
Vein mining: Purington, 06  
Vein-filled openings, southeastern Alaska: Spencer (A C), 05d  
Wolframite and cassiterite, Birch Creek district: Johnson (B L), 10  
Wolframite-topaz ore from Lost River: Knopf, 08c  
Wrangell district: Chapin, 17  
Yakataga district: Maddren, 14; Thompson (A G), 15  
Yakutat Bay region: Tarr, 06  
Yentna district: Capps, 13  
Yukon-Koyukuk region: Eakin, 14b, 16  
*Historical geology.*  
Alaska Peninsula: Atwood, 11; Stanton, 05c  
Alatna-Noatak region: Smith (P S), 12a  
Alluvial deposits, Yukon River: Dall, 69b  
Anvik-Andreafski region: Harrington (G L), 17, 18  
Arctic slope: Leffingwell, 13  
Balboa-Herenden Bay district: Atwood, 09b  
Berners Bay region: Knopf, 11  
Bonnifield region: Capps, 12  
Broad Pass region: Moffit, 15  
Cantwell formation, Alaska Range: Pogue, 15a  
Cape Lisburne region: Collier, 06  
Cape Nome region: Brooks, 01; Halla, 07; Moffit, 07; Schrader, 00  
Cape Thompson section: Kindle, 09c  
Chandler and Koyukuk rivers: Schrader, 00b  
Chisana-White River district: Capps, 15c, 16  
Chitina River region: Rohn, 00  
Chitina Valley: Moffit, 16, 18



## Alaska—Continued.

*Historical geology*—Continued.

- Circle quadrangle: Prindle, 06a, 13b  
 Controller Bay region: Martin (G C), 08  
 Cook Inlet region: Paige, 07; Stanton, 05c  
 Copper Mountain: Wright (C W), 15  
 Copper River region: Mendenhall, 05; Schrader 00a, 01; Tarr, 13a; Carboniferous: Mendenhall, 03d  
 Cosna-Nowitna region, Alaska: Eakin, 18  
 Eagle River region: Knopf, 12  
 Ellamar district: Capps, 15a  
 Ellipsoidal lavas, Prince William Sound Capps, 14a, 15d  
 Fairbanks district: Prindle, 10, 13  
 Fort Hamlin to Kotzebue Sound: Mendenhall, 02  
 Fortymile quadrangle: Prindle, 09  
 General: Dall, 68, 69a, 96; Eldridge, 99; Emerson, 04; Emmons (S F), 98a, b; Fischer, 72  
 Glacier Bay: Cushing, 96  
 Grand Central quadrangle: Moffit, 13  
 Gravina Island: Chapin, 18a; Smith (P S), 15  
 Gulkana-Susitna region: Moffit, 12  
 Hanagita-Bremner region: Moffit, 14  
 Iditarod-Ruby region: Eakin, 14  
 Iliamna region: Martin (G C), 12a  
 Jurassic strata: Daqué, 11  
 Kachemak Bay: Parks (G A), 15  
 Kasaan Peninsula: Wright (C W), 15  
 Kenai Peninsula: Martin (G C), 15  
 Ketchikan and Wrangell districts: Wright (F E), 08  
 Ketchikan district: Brooks, 02a  
 Kotsina-Chitina region: Moffit, 09b  
 Kotsina-Kuskulana district: Mertie, 15; Moffit, 15a  
 Koyukuk-Chandalar region: Maddren, 13  
 Koyukuk-Kobuk region: Smith (P S), 11b  
 Kuskokwim region: Smith (P S), 15b  
 Lake Clark-central Kuskokwim region: Smith (P S), 17  
 Lake Clark-Iditarod region: Smith (P S), 15a, 16a  
 Lake Iditarod region: Smith (P S), 16  
 Matanuska and Talkeetna basins: Paige, 07a, b  
 Matanuska coal field: Martin (G C), 06b  
 Matanuska Valley: Martin (G C), 12b  
 Mesozoic stratigraphy: Martin (G C), 12  
 Middleton Island: Dawson (G M), 93  
 Miocene and Cretaceous: Eichwald, 71  
 Mount McKinley region: Brooks, 08c, 11  
 Mount Wrangell district: Mendenhall, 03  
 Mount St. Elias region: Novarese, 00; Russell, 91c; Quaternary history: Maddren, 14a  
 Muir Glacier region: Cushing, 92  
 Nelchina-Susitna region: Chapin, 15, 18  
 Nenana region: Overbeck, 17  
 Nizina district: Moffit, 11a  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome quadrangle: Moffit, 13  
 Northern Alaska: Schrader, 04  
 Norton Bay region: Mendenhall, 01  
 Norton Bay-Nulato region: Smith (P S), 11c  
 Orange group: Cairnes, 12e  
 Ordovician, southeastern Alaska: Kirk, 18b

## Alaska—Continued.

*Historical geology*—Continued.

- Paleozoic glaciation, southeastern Alaska: Kirk, 18a  
 Pleistocene: Maddren, 05  
 Porcupine to Arctic boundary: Maddren, 12a  
 Porcupine Valley: Kindle, 08a  
 Port Clarence limestone: Kindle, 11d  
 Port Valdez district: Johnson (B L), 15a  
 Prince Rupert to Skagway: Wright (F E), 13e  
 Prince William Sound: Schrader, 00a  
 Pyramid Harbor to Eagle City: Brooks, 00a  
 Quaternary history, central Alaska: Eakin, 17b  
 Rampart quadrangle: Eakin, 13  
 Rampart region: Prindle, 06b  
 Reconnaissance map: Brooks, 07d  
 Resurrection Bay to Tanana River: Mendenhall, 00  
 Revillagigedo Island: Chapin, 18a  
 Rocky Mountains: Schrader, 02  
 Ruby-Kuskokwim region: Mertie, 16  
 Seward Peninsula: Collier, 08a; Knopf, 08b, Moffit, 05; northwestern part: Collier, 02; southeastern part: Smith (P S), 11c  
 Sitka district: Knopf, 12a  
 Southeastern Alaska: Brooks, 02a, b; Kindle, 07  
 Southwestern: Atwood, 08c; Spurr, 00  
 Stepovak Bay region: Palache, 04b  
 Susitna basin: Eldridge, 00  
 Talkeetna basin: Paige, 07a, b  
 Tanana basin: Brooks, 00  
 Tertiary: Dall, 82  
 Tertiary basin: Kindle, 07b  
 Tolovana district: Brooks, 16; Mertie, 17  
 Triassic: Martin (C C), 16  
 Turnagain Arm region: Moffit, 03  
 Turnagain-Knik region: Capps, 16a  
 Volcanic ash layer, Yukon basin: Capps, 15  
 White Pass region: Heydon, 98  
 White River basin: Brooks, 00  
 White River region, copper-bearing amygdaloids: Knopf, 10  
 Willow Creek district: Capps, 15b  
 Yakataga district: Maddren, 14  
 Yakutat formation: Ulrich, 04a  
 Yakutat Bay region: Blackwelder, 07; Tarr (R S), 09, 09a  
 Yentna district: Capps, 13  
 York region: Collier, 04a  
 Yukon district: Spurr, 98a; coal-bearing series: Collier, 03b  
 Yukon, upper, Paleozoic section: Brooks, 07c, 08a  
 Yukon-Alaska boundary survey: Cairnes, 13c, 14, 14b, c  
 Yukon-Koyukuk region: Eakin, 14b, 16
- Mineralogy.*  
 Boron minerals of contact-metamorphic origin: Knopf, 08d  
 Chalmersite, Prince William Sound: Johnson (B L), 17b, 18  
 Epidote crystals: Palache, 02  
 General: Palache, 04c  
 Hulsite and paigeite: Schaller, 10  
 Gold, galenite, and pyrite crystals intergrown: Pogue, 11b  
 Jade, supposed: Merrill (G P), 85c



## Alaska—Continued.

*Mineralogy*—Continued.

Pyrite with gold and galena: Pogue, 09a  
Zinnwaldite: Schaller, 07a

*Paleontology*.

Cape Lisburne region, invertebrates: Girty, 06;  
plants: Knowlton, 06; White (D), 06b  
Cretaceous and Tertiary floras: Hollick, 11c, 13a  
Elephant teeth: Blake (W P), 67g  
Elephas primigenius: Gaudry, 72, 73  
Equus, skull: Hay, 13a  
Fruit or nut, supposed, Tertiary: Thomas  
(A O), 17a  
General: Dall, 96; Fischer, 72; Grewingk, 50a;  
Pinart, 75  
Isocrinus, Triassic: Bather, 18  
Interglacial wood, Muir glacier: Knowlton, 95c  
Invertebrata: White (C A), 89a  
Jurassic: Pompeckj, 00  
Jurassic flora, Cape Lisburne: Knowlton, 14;  
Matanuska Valley: Knowlton, 16c  
Kenai flora: Hollick, 11b  
Mammoth: Dawson (G M), 94a; Maddren, 05a;  
Quackenbush, 09  
Mesozoic: Hyatt, 96a; White (C A), 84a  
Miocene and Cretaceous: Eichwald, 71  
Miocene flora: Lesquereux, 83a; Cook Inlet:  
Heer, 68a  
Miocene Scala: Dall, 08  
Mytilus middendorffii: Gratacap, 12a  
Neozoic Invertebrata: Dall, 04  
Paleozoic faunas: Kindle, 07; Schuchert, 96  
Pecten, new species: Dall, 07c  
Plantae: Heer, 69; Knowlton, 94, 94c, 96a  
Alaska Peninsula, Kukak Bay: Knowlton, 04  
Mount St. Elias region: Knowlton, 91a  
Yukon River: Knowlton, 98a, 04a  
Pleistocene: Maddren, 05; ruminants: Gidley,  
08; Vertebrata: Gaudry, 03; Gilmore, 08;  
Eschscholtz Bay: Buckland, 31  
Port Clarence limestone faunas: Kindle, 11d  
Silurian fauna: Kindle, 08  
Tertiary freshwater Mollusca: Hannibal, 12  
Triassic, southeastern Alaska: Atwood, 12  
Woods, fossil: Platen, 08  
Yakutat fauna: Ulrich, 04a

*Petrology*.

Circle quadrangle: Mertie, 13  
Eruptive rocks, Muir Glacier region: Williams  
(G H), 92b  
General: Cessac, 75; Pinart, 75  
Glacier Bay: Cushing, 96  
Granite: Adams (F D), 91  
Hornblende andesite, Bogosloff: Merrill (G P),  
84c, 85  
Hypersthene andesite, Edgecumbe: Cushing,  
97a  
Igneous rocks, Chitina Valley: Overbeck, 18  
Lava, Bogosloff Island: Diller, 85c  
Mount McKinley region: Prindle, 11  
Scapolite rocks: Spurr, 00c, 09  
Southern Alaska: Becker, 98  
Southwestern Alaska: Spurr, 00  
Stepovak Bay region: Palache, 04b  
Volcanic rocks, Bogoslof Islands: Smith (P S),  
08a  
Volcanic sand, Unalaska: Diller, 84c, g

## Alaska—Continued.

*Petrology*—Continued.

Yakutat Bay region: Butler, 09  
Yukon district: Spurr, 98a

*Physical geology*.

Alaska Range, glaciation: Capps, 12b  
Alluvial deposits, Yukon River: Dall, 69b  
Bogoslof Islands: Smith (P S), 08a; volcanic  
eruptions: Eakle, 08.  
Change of level: Meehan, 83; Tarr (R S), 05  
Earthquakes, Yakutat Bay: Tarr (R S), 12b  
Earthquakes and volcanoes: Perrey, 66  
Earthquakes of 1899: Martin (L), 10b  
Ellipsoidal lavas, Prince William Sound: Capps  
15d  
Faulting, oblique minor: Martin (L), 07  
Fiords, filling: Martin (L), 15  
Folded slates of glacial origin: Blackwelder, 07  
Glacial erosion: Tarr (R S), 07e  
Glacial Bay ice field, recent changes in: Wright  
(F E), 07  
Glacier drainage and wastage: Von Engel, 11  
Glaciers: Blake (W P), 67a; Davidson (G), 04;  
Gilbert, 04; Martin (L), 11b, c, 13i;  
Meehan, 84; Muir, 02; Topham, 89; Wolff  
(W), 15  
Alaska Peninsula: Grant (U S), 10d  
Allen Glacier: Martin (L), 13d  
Baird Glacier: Klotz, 95  
Barry Glacier, retreat 1910-1914: Johnson  
(B L), 16  
Coastal glaciers: Martin (L), 12; Prince  
William Sound and Kenai Peninsula:  
Grant, 13  
Glacier Bay: Reid, 96; recession: Morse, 08  
Hubbard Glacier: Martin (L), 10a; front in  
1792 and 1794: Tarr (R S), 07c  
Kobuk Glacier: Hershey, 09  
Malaspina Glacier: Russell, 93, 93b; Tarr (R S)  
07b, d  
Mount St. Elias region: Belcher, 62  
Muir Glacier: Andrews (C L), 03; Baldwin,  
92; Chickering, 88; Cushing, 93; Lam-  
plugh, 85; Reid (H F), 92, 92a; Wright  
(G F), 87, 91, 92c; changes: Baldwin, 93;  
oscillations of: Tarr (R S), 10a  
Prince William Sound: Grant (U S), 10d;  
Martin (L), 13e  
Prince William Sound and Kenai Peninsula:  
Grant (U S), 10d, 13  
recession: Klotz, 07a  
southeastern Alaska: Klotz, 99; Martin (L),  
15b  
variations of: Reid (H F), 10a  
Yakutat Bay, Prince William Sound, and  
Copper River region: Tarr (R S), 14a  
Yakutat Bay glaciers: Tarr (R S), 06e, 08, 10c  
Grewingk Island: Dall, 84a  
Ground-ice wedges, north coast: Leffingwell, 15  
Lateral erosion of streams: Eakin, 10  
Rock glaciers: Capps, 10a  
Striations in gravel bars: Barnett, 08a  
Thrust fault, Nizina River: Capps, 15g  
Volcanic activity: Crosby, 07a  
Volcanic ash, fall on Seward Peninsula: Smith  
(P S), 12c  
Volcanic sand, Unalaska: Diller, 85



## Alaska—Continued.

*Physical geology*—Continued.

- Volcanoes: Cordeiro, 10; Dall, 18; Anon, 12g  
 Bogoslof: Davidson (G), 84a; Jaggar, 08c;  
 Merriam (C H), 02, 02a; Powers, 16c, d;  
 Anon, 84 b, e  
 Katmai: Abbot (C G), 13a; Martin (G C), 13a;  
 eruption: Clark (G A), 12; Dailey, 12;  
 Griggs, 18, 18a; hot mud flow: Griggs, 18c;  
 Ten Thousand Smokes: Griggs, 18b  
 Mount St. Augustin, eruption, October 6,  
 1883: Davidson (G), 84  
 Underground ice in northern Alaska: Stefán-  
 son, 10  
 Warping, recent: Goodrich, 98  
 Yakutat Bay region: Tarr (R S), 07a, f; changes  
 of level: Tarr (R S), 06c, d  
 Yakutat coastal plain formation: Blackwelder,  
 09b

*Physiographic geology*.

- Alaska Peninsula: Atwood, 11  
 Arctic slope: Leffingwell, 13  
 Bogoslof Island: Dall, 85a; Jordan, 06a  
 Cape Nome region: Brooks, 01  
 Chitina River region: Rohn, 00  
 Coast glacial features: Blackwelder, 07b  
 Copper River basin: Spencer (A C), 01a; Tarr  
 (R S), 13a  
 Copper River district: Martin (L), 13g; Men-  
 denhall, 05; Schrader, 99, 01  
 Cosna-Nowitna region: Eakin, 18  
 Differential erosion and equiplanation: Cairnes,  
 12d  
 Fiords, southeastern Alaska: Williams (F E), 15  
 Flaxman Island a glacial remnant: Leffingwell,  
 08  
 Fossil glacier, Yakutat Bay: Dall, 80  
 General: Atwood, 08b; Blake (T A), 69a;  
 Brooks, 02c, 05c, 14b; Dall, 68a; Eldridge,  
 99; Goodrich, 98; Russell, 90, 94; Sargent,  
 09  
 Glacial stages: Capps, 15f  
 Glaciation: Dall, 84; Gilbert 04; Muir, 84, 17;  
 Russell, 90; Tarr (R S), 12c; Wright  
 (G F), 87a  
 age: Capps, 15e  
 Broad Pass region: Moffit, 15  
 Copper River region: Allen (H T), 86  
 lack of evidence of: Hyatt, 68a; Shaler, 68a  
 Nabesna-White River district: Capps, 10c  
 northwestern Alaska: Smith (P S), 12  
 Seward Peninsula: Brooks, 01b  
 Wrangell Mountains: Capps, 10  
 Glacier Bay: Martin (L), 14a; Reid, 93, 96  
 Ice cliffs, Kowak River: Russell, 90a  
 Iliamna and Clark Lakes region: Martin (G C),  
 10a  
 Innoko district: Maddren, 10  
 Juneau-Yakutat section: Martin (L), 13  
 Kenai Peninsula: Tarr (R S), 13b; southern part:  
 Grant (U S), 10a  
 Lake Clark-central Kuskokwim region: Smith  
 (P S), 17  
 Malaspina glacier region: Martin (L), 09a  
 Mount McKinley region: Brooks, 02d, 11

## Alaska—Continued.

*Physiographic geology*—Continued.

- Mount St. Elias region: Dall, 78; Russell, 91c, d,  
 92a, 93; Quaternary history: Maddren,  
 14a  
 Muir glacier region: Cushing, 91  
 Nabesna-White River district: Moffit, 10a  
 Nelchina-Susitna region: Chapin, 18  
 Noatak River: Smith (P S), 13d  
 Nulato-Council region: Smith (P S), 10a  
 Pacific Mountain system: Spencer (A C), 03c  
 Physiographic provinces: Brooks, 16b  
 Point Hope spit: Kindle, 09a  
 Prince Rupert to Skagway: Wright (F E), 13c  
 Prince William Sound region: Grant (U S),  
 10b; Martin (L), 13e  
 Probilof islands: Stanley-Brown, 92  
 Quaternary history, central Alaska: Eakin, 17b  
 Quaternary problems: Eakin, 13  
 Resurrection Bay-Tanana River: Mendenhall,  
 99  
 Solomon and Casadepaga quadrangles, Seward  
 Peninsula: Smith (P S), 10  
 Surface geology: Russell, 90  
 Valdez delta: Johnson (B L), 18a  
 Wrangell Mountains: Mendenhall, 03c  
 Yakutat Bay region: Tarr (R S), 08, 09  
 Yukon district: Spurr, 98a  
 Yukon-Koyukuk region: Eakin, 16  
*Underground water.*  
 Mineral springs: Waring (G A), 17  
 Alaska Range, glaciation: Capps, 12b  
 Alaskaites: König, 81  
 Alatna-Noatak region, Alaska: Smith (P S), 12a  
 Albany terranes, Vermont: Richardson (C H), 12a  
 Alberta.  
 Athabasca region: Alcock, 15; McConnell, 91a;  
 Petitot, 83  
 Athabasca Lake-Churchill River region: Tyr-  
 rell, 96  
 Bibliography of geology and mining industry:  
 Gwillim, 08  
 Blairmore area: Rose, 16a  
 Bow River valley: McConnell, 92  
 Field work along international boundary: Daly,  
 07a  
 Foothills region: Rose, 15; Stewart (J S), 15  
 Fort Smith region: Camsell, 03  
 General: Bryce, 07; Hector, 61; Weston, 99a  
 Mount Robson: Coleman, 10b  
 Northern Alta.: Dawson (G M), 81a; McCon-  
 nell, 90, 93  
 Peace and Athabasca rivers: Macoun, 77  
 Rocky Mountains region: Coleman, 94a; Dow-  
 ling, 08; McConnell, 93a; Woolacott, 10  
 Rocky Mountains Park: Allan, 15  
 Sheep River area: Slipper, 15  
 Western Alta.: McEvoy, 99  
*Economic geology.*  
 Anthracite, Anthracite: Poole, 03a; Bow River:  
 Dodge, 88.  
 Athabasca River: Bell (R), 85a  
 Bituminous sands, northern Alta.: Ells (S C),  
 14, 14a, 16, 17, 17a  
 Blairmore-Frank coal fields: Leach, 03  
 Bow and Belly rivers region: Dawson (G M),  
 85



## Alberta—Continued.

*Economic geology—Continued.*

Building and ornamental stones: Parks (W A), 16

Calgary gas and oil field: Slipper, 15a

Cascade coal basin: Dowling, 05

Clay: Keele, 15a; McMurray: Ells (S C), 15

Clay and shale deposits: Ries, 11, 11a, 12c, 13b, 14c, d, 15

Coal: Armstrong, 04; Dawson (G M), 84; Denis, 06, 12; Dowling, 06a, 08, 07a, 09, 09a, b, 10, 12a, c, 17a; Dulieux, 10a; Fullerton, 12; Gwillim, 05, 07; Hardie, 10; Hoffman, 85; Kinahan, 84; Malloch, 08; Merritt, 90; Panton, 88a; Scott (J G), 09; Smith (F B) 02; Thompson (P), 06b

Anthracite: Poole, 03a

Bankhead: Turnbull, 04

Bighorn and Brazeau lands: McEvoy, 09a

Bighorn basin: Malloch, 09, 11

Bighorn, Brazeau, and Saskatchewan lands: Dowling, 09e

Blairmore area: Leach, 12

Blairmore Frank fields: Leach, 03

Bow and Belly rivers region: Dawson (G M), 83, 83c, 85

Cascade basin: Dowling, 05a, 07, 09a; Merritt, 86

Cascades, Palliser, and Costigan basins: Malloch, 08

Crowsnest Pass region: Brewer, 02d; Rickert, 02; Rose, 17a

Drumheller field: Dowling, 17a; Macaulay, 15

Edmonton field: Dowling, 10a

foothills north of Grand Trunk Pacific railway: MacVicar, 17

Galt field: Hardie, 10

Jasper Park field: Dowling, 11a; O'Neal, 14a

Kananaskis area: Dowling, 09f; McEvoy, 09

Medicine Hat: Panton, 88

North Saskatchewan River: Dowling, 14d

Roche Miette area: Dowling, 12

Smoky River field: O'Neal, 14

southern Alta.: Dowling, 17

South Fork district: MacKenzie, 14

west central Alta.: Stewart (J S), 17

western Alta.: Leach, 13

Coal basins, Rocky Mountains: Dowling, 04b

Costigan coal basin: Dowling, 05

Crowsnest coal field: Rose, 17a

Gold, North Saskatchewan River: Tyrrell, 15c

Gypsum, northern Alta.: Camsell, 17

Iron, Blairmore area: Leach, 12

Lignite areas: Dowling, 09a

Moose Mountain district: Cairnes, 07

Natural gas: Denis, 06; Dowling, 18c; Fullerton, 12a; Malcolm, 13; Slipper, 17

Calgary field: Ellsworth (W E), 14

Moose Mountain district: Cairnes, 07

Viking field: Slipper, 18a

North Saskatchewan River: Tyrrell, 16a  
country south of: Tyrrell, 87

Northern Alta.: McConnell, 93

Oil and gas, Sheep River field: Dowling, 14a, c

Oil, gas, and water: Dowling, 17a

28738°—24—2

## Alberta—Continued.

*Economic geology—Continued.*

Oil fields, correlation and structure: Dowling, 15b

prospective: Craig, 15

Petroleum: Bell (R), 81a; Craig, 14, 14a; Daly, 06d; Denis, 06; Dowling, 15b; Malcolm, 13; Slipper, 17

along international boundary: Daly, 06d

Calgary field: Ellsworth (W E), 14; Slipper, 15a

Moose Mountain district: Cairnes, 07

Peace River region: McLearn, 18

Sheep River area: Slipper, 18

Southern Alta.: Dowling, 15c

Phosphate, Banff district: Adams (F D), 15a;

De Schmid, 16a, 17; southern Alta.:

Adams (F D), 16, 17b, c

Roche Miette area, Jasper Park: Dowling, 12

Rocky Mountain area: Dowling, 06a, 08

Salt, northern Alta.: Camsell, 17

Shale: Keele, 15a; Ries, 13b, 15

Southern Alta.: Dowling, 15d

South Fork coal area, Oldman River: MacKenzie, 14

Tar sands, Athabasca River: Bell (R), 08a; McConnell, 91b; McLearn, 17

*Historical geology.*

Anthracite: Poole, 03a

Athabasca district: Petitot, 83

Athabasca Lake-Churchill River region: Tyrrell, 96

Athabasca River: Bell (R), 85a; McLearn, 17

Banff district: Adams (F D), 15a; De Schmid, 16a, 17; Ogilvie, 04

Banff-Golden: Allan, 14a

Bighorn coal basin: Malloch, 11

Blairmore area: Leach, 12

Blairmore-Frank coal fields: Leach, 03

Borings: Dawson (G M), 00; Fraser, 99; Huntley, 15a; Slipper, 17

Athabasca Landing: Dawson (G M), 96; Fraser, 95

southern Alta.: Dowling, 18

west central Alta.: Stewart (J S), 17

Bow and Belly rivers region: Dawson (G M), 83, 85

Bow River valley: Merritt, 86

Calgary to Tofield: Dowling, 13a

Cambrian: Walcott, 17

Cascade coal basin: Dawson (G M), 88a; Dowling, 05a, 07; Merritt, 86

Central Alta.: Allan, 18

Coal basins, Rocky Mountains: Dowling, 04b

Coal fields: Leach, 13

Cordillera: Burling, 16d

Costigan coal basin: Dowling, 05

Cretaceous: Dowling, 15e; Dawson (G M), 89b; Dawson (J W), 86a; Sinclair (J H), 16

Athabasca River: Tyrrell, 98b

Crowsnest River: McLearn, 15

Crowsnest coal field: Rose, 17a

Crowsnest Pass region: Brewer, 02d; McLearn, 16

Crowsnest volcanics: Mackenzie, 14b



## Alberta—Continued.

*Historical geology*—Continued.

- Dunmore to Burmis: Dowling, 13a  
 Edmonton area: MacLean (A), 13  
 Field area: Allan, 14  
 Foothills north of Grand Trunk Pacific Railway: MacVicar, 17  
 Formations, table of: Brock, 10a  
 Forty-ninth parallel: Dawson (G M), 75  
 General: Adams (F D), 15a; Craig, 14, 15; Collins (W H), 13c; Dawson (G M), 74a, 84a; Dowling, 13; Hector, 59, 63; Malcolm, 13; Panton, 84, 88a; Penhallow, 05b; Selwyn, 74  
 International boundary survey: Daly, 06d  
 Lake Minnewanka section: Shimer, 11  
 Laramie: Dawson (J W), 87a  
 Mackenzie River region: Meek, 67  
 Medicine Hat: Panton, 88  
 Moose Mountain district: Cairnes, 07; Dowling, 06b  
 Northern Alta.: Camsell, 17; Dawson (G M), 81a; McConnell, 93  
 North Saskatchewan River: Tyrrell, 15c; country south of: Tyrrell, 87  
 Oil fields, correlation and structure: Dowling, 15b; southern Alta.: Dowling, 15c  
 Peace River region: Dawson (G M), 81d; McLearn, 18  
 Phosphate region: Adams (F D), 17b  
 Pleistocene deposits: Alden, 13  
 Pre-Cambrian rocks, Bow River Valley: Walcott, 08a  
 Red Deer River: Sternberg, 17  
 Robson Peak district: Walcott, 10  
 Roche Miette area, Jasper Park: Dowling, 12  
 Rocky Mountains: Allan, 13; Burling, 16; Coleman, 94a; Dawson (G M), 86, 87c; McConnell, 87  
     geologic history: Allan, 17  
 Simpson Pass to Kananaskis: Allan, 16  
 Sheep River region: Dowling, 14a, c  
 Southern Alta.: Adams (F D), 16; Dowling, 15d, 17; Slipper, 16  
 South Fork coal area, Oldman River: MacKenzie, 14  
 Southwestern Alta.: Stewart (J S), 16  
 Tofield to Tete Jaune: Dowling, 13a  
 Turtle Mountain, Frank: Daly, 12c  
 Viking area: Slipper, 18a  
 Whitemans Pass section: Drysdale, 18  
 Yellow Head Pass region: McEvoy, 00

*Mineralogy*.

Meteorite, Iron Creek: Coleman, 87

*Paleontology*.

- Ammonites, Cretaceous, Athabasca district: Whiteaves, 93; Peace River: Whiteaves, 85b  
 Anchiceratops, Edmonton, Cretaceous: Brown (B), 14a  
 Aspideretes, Belly River formation: Lambe, 14a  
 Belly River fauna: Lambe, 02  
 Boremys, Cretaceous chelonian: Lambe, 06c  
 Cambrian, Robson Peak region: Walcott, 10  
 Cardioceras, Crows Nest: Whiteaves, 03d  
 Centrosaurus, Cretaceous: Lambe, 04b, 05a  
 Ceratopsia, Styracosaurus: Lambe, 13c

## Alberta—Continued.

*Paleontology*—Continued.

- Cheneosaurus tolmanensis, Edmonton Cretaceous: Lambe, 17a  
 Compsemys, Cretaceous: Lambe, 01a  
 Corythosaurus, Belly River Cretaceous: Brown (B), 14c  
 Cretaceous: Whiteaves, 89b  
     Reptilia: Lambe, 99c  
     Saskatchewan country: Whiteaves, 87b  
     woods: Penhallow, 08a  
 Crocodilian genus and species, new: Lambe, 07  
 Cyrena: Whiteaves, 03a  
 Decapod crustacean, Cretaceous, Highwood River: Whiteaves, 85a  
 Devonian, Mackenzie River basin: Whiteaves, 91  
 Dinosauria: Lambe, 15; Matthew (W D), 12b; Sternberg, 17  
     Belly River formation: Lambe, 14c, d, e  
     Edmonton series: Brown (B), 12b, 13  
 Dryptosaurus, Edmonton series: Lambe, 04  
 Dryptosaurus incrassatus: Lambe, 03a  
 Edmontonosaurus regalis, Edmonton formation: Lambe, 17b  
 Eodelphis Red Deer River: Matthew (W D), 16  
 Ganoid fishes, Banff: Lambe, 16  
 General: Penhallow, 05b  
 Gorgosaurus, Cretaceous: Lambe, 17  
 Gryposaurus, Belly River formation: Lambe, 14d  
 Helodont teeth, Roche Miette: Lambe, 13  
 Hypacrosaurus, Edmonton Cretaceous: Brown (B), 13c  
 Invertebrata, Bow and Belly rivers: Whiteaves, 95  
 Laramie flora: Dawson (J W), 87a  
 Leptoceratops, Edmonton Cretaceous: Brown (B), 14d  
 Leurospondylus, Edmonton Cretaceous: Brown (E P), 13  
 Loelaps, Red Deer River: Cope, 92c  
 Mackenzie River region: Meek, 67  
 Mesozoic floras, Rocky Mountain region: Dawson (J W), 86a  
 Mid-Cretaceous fauna: Osborn, 02c  
 Monoclonius, Cretaceous: Lambe, 04b, 05a; Belly River: Brown (B), 14b; Red Deer River: Brown (B), 17  
 Mount Whyte fauna: Walcott, 17  
 Olenopsis from Cambrian: Walcott, 10  
 Ornithomimus: Lambe, 04a  
 Peltoceras: Whiteaves, 07a  
 Plantæ, Belly River beds: Dawson (J W), 85c  
     Bow River: Dawson (J W), 90d  
     Cretaceous: Dawson (J W), 88d  
     Red Deer River: Penhallow, 02a  
     Tertiary: Penhallow, 05a  
 Platysomus, Banff: Lambe, 14b  
 Prosaurolophus, Red Deer River: Brown (B), 16  
 Red Deer Canyon fossils: Brown (B), 11  
 Red Deer River: Brown (B), 11; Lambe, 99a, 02a; Sternberg, 17  
 Saurolophus, Edmonton beds: Brown (B), 13b  
 Selachian, Cretaceous: Lambe, 18b



**Alberta—Continued.***Paleontology—Continued.*

Silurian, Lake Winnipegosis region: Whiteaves, 91b

Southern plains: Dowling, 17

Spiriferoids, Lake Minnewanka section: Shimer, 13

Stegosaurus: Lambe, 18

Trachodon, Edmonton formation: Lambe, 13a

Tree stumps, Drumheller: Hargreaves, 16

Trionyx, Cretaceous: Lambe, 02b

Vertebrata: Sternberg, 18

Cypress Hills: Cope, 91a

Milk River: Cope, 75f

Widdringtonites: Berry, 12b

*Petrology.*

Analcite, Crowsnest volcanics: MacKenzie, 15b

Analcite trachyte tuffs and breccias: Knight (C W), 05

Crowsnest volcanics: MacKenzie, 14b

Waterton dolomite: Daly (R A), 17d

*Physical geology.*

Glaciers: Vaux (G), 07, 07a, 10

activity: Sherzer, 08

Selkirk and Rock Mountains: Sherzer, 05, 06, 07

variations: Vaux (G), 04, 06, 07

Iron, reduced naturally: Tyrrell, 87a

Landslide, Frank: Ashworth, 05; Blakemore, 03; Brewer (W M), 03c; Burling, 09; Daly, 12c; Dowlen, 03; Green (R), 03; McConnell, 04a; Smith (F B), 03

*Physiographic geology.*

Banff area: Ogilvie, 04

Drift deposits and ice sheets: Coleman, 10c

Glacial deposits, southwestern Alta.: Dawson (G M), 95c, d

Glaciation: Dawson (G M), 83

Lake basins: Parkinson, 01

Medicine Hat: Panton, 88

Mountain forms in the Canadian Rockies: Coleman, 08d

North Saskatchewan River, country south of: Tyrrell, 87

Rocky Mountains: Dawson (G M), 87c; Fay, 11; Woolacott, 10; physical history: Dawson (G M), 01

Southern plains: Dowling, 17

Surface geology: Chalmers, 06

*Underground water.*

Southeastern Alta.: Dowling, 16a

Southern Alta.: Dowling, 18

Albert shales fish fauna, N. B.: Lambe, 09

Albertella fauna: Burling, 14

Albertite.

New Brunswick: Ells, 08a, b, 10; Hind, 65; Milner, 12

Origin: Peckham, 69a

Albirupean formation: Heilprin, 88c; Lewis (H C), 88; Uhler, 88

Albirupean series: Uhler, 92

Albuquerque region, N. Mex.: Bryan, 09

Aleutian Islands: Dawson (G M), 94; Jaggard, 08b

Alexandria folio, S. Dak. (no. 100): Todd, 03c

Alexandria Bay quadrangle, N. Y.: Cushing, 10a

Alexandria series: Keyes, 15e

Alexandrian series, Ill.: Savage, 13, 13a, 14a

Algae: James (J F), 85a, 92b, 94a; Newberry, 85b

Algonkian: Walcott, 14, 16

Appalachian region: White (D), 96b

Bythotrephes, Yukon: Ami, 05d

Canada: Dawson (J W), 86g

Cryptozoön: Wieland, 14

Dasycladaceae, Cerro Escamela, Mexico: Steinmann, 99

Dictyophyton: Hall, 63h

Eocene: Davis (C A), 15d

Green River formation: Davis (C A), 15a, 16

Hippodophycus: Hall, 72a

Lithothamnicae, Panama Canal Zone: Howe, 18

Occurrence in carbonaceous deposits: Davis (C A), 15b, c

Ozarkian seaweeds and oolites: Wieland, 14

Palaeodictyota, Niagara shale: Whitfield, 02c

Panama Canal Zone: Howe (M A), 15

Pennsylvania, Peach Bottom slates: Frazer, 84c

Pre-Paleozoic: Walcott, 15b

Scolithus: James (J F), 92c

Spirophyton: Hall, 63g

Trenton limestone: Whitfield, 94a; New York: Ruedemann, 09a

Wyoming, Teton Mountains: Blackwelder, 15a

Algallimestone, Belcher Islands: Moore (E S), 18

Algal reef, Teton Mountains: Blackwelder, 15a

Alger, Francis, biography: Jackson, 65

Algoid lake balls: Clarke (J M), 00d

Algonkian. *See also* Pre-Cambrian.

Arizona, Bradshaw Mountains quadrangle: Jaggard, 05

Colorado, Pikes Peak quadrangle: Cross, 94

Rico quadrangle: Cross, 05a

Silverton quadrangle: Cross, 05

Telluride quadrangle: Cross, 99

General: Van Hise, 92

Maryland, Harpers Ferry quadrangle: Keith, 94

Massachusetts, Holyoke quadrangle: Emerson, 98a

Michigan, Menominee quadrangle: Van Hise, 00

Montana: Walcott, 06

Little Belt Mountains: Weed, 99a

Livingston quadrangle: Iddings, 94

North Carolina, Asheville quadrangle: Keith 04

South Dakota, Alexandria quadrangle: Todd 03c

Black Hills, northern: Jaggard, 04c

Mitchell quadrangle: Todd, 03b

Olivet quadrangle: Todd, 03

Vermont: Dale (T N), 16

Virginia, Harpers Ferry quadrangle: Keith, 94

Wyoming, Hartville quadrangle: Smith (W S T), 03

Sundance quadrangle: Darton, 05a

Algonkian bacteria: Walcott, 15a

Algonquin and Nipissing shore lines in Ontario: Goldthwait, 09b

Algonquin beach, altitude of: Goldthwait, 08a; isobases of: Goldthwait, 10a

Alkali.

Colorado: Headden, 18; San Luis Valley: Fleck, 05

Nebraska: Barbour (E H), 16c

Wyoming: Knight (W C), 01b



Alkali spots of drift sheets: Willcox, 05  
 Alkaline rocks, origin: Daly, 10a, 18  
 Allanite, weathering of: Watson, 17  
 Alleghany district, Cal.: Ferguson, 14a; Martin (A H), 09a  
 Alleghany series: White (D), 00a  
 Alleghany structure, mechanics of: Ashley, 08  
 Allosaurus: Gilmore, 15a; Matthew (W D), 08; Osborn, 12c  
 Alluvial fans: Grabau, 13b; Lawson, 13  
   Alaska, Yakutat Bay region: Tarr, 08  
   British Columbia, Field: Lahee, 08, 08a  
   California, Owens Valley: Trowbridge, 11  
   Illinois Valley: Barrows, 08  
 Alma district, Park Co., Colo.: Patton, 12  
 Altiplanation: Eakin, 14c  
 Altoona, Devonian section: Butts, 06  
 Alum.  
   Nevada, Silver Peak quadrangle: Spurr, 06b  
   New Mexico, Gila River deposits: Hayes, 07  
   United States: U S G S, 83  
 Aluminium hydrates: Wysor, 17  
 Aluminum: Hunt (A E), 93; Packard (R L), 97; Phalen, 08b, 12a; U S G S, 83  
   Canada: McLeish, 10, 14  
   Tennessee: Ashley, 12c  
 Alunite. *See also* Potash.  
   Arizona, Patagonia: Schrader, 13a, 14  
   British Columbia, Kyuquot Sound: Clapp (C H), 15  
   Colorado, Rosita Hills: Cross, 12  
   San Cristobal quadrangle: Larsen, 13  
   Nevada, Bovard: Schrader, 13a, 11a  
   Humboldt Co., Sulphur: Clark (I C), 18  
   Utah, Marysville: Butler (B S), 12b; Loughlin, 15  
 Alveolites: Nicholson, 77  
 Amber: Berry, 07; Hagen, 74; Hollick, 05  
   Laramie Cretaceous: Cockerell, 09m  
   Maryland, Ann Arundel Co.: Troost, 21  
   Massachusetts, Nantucket Island: Goldsmith, 79a  
   New Jersey, Gloucester Co., Cretaceous: Kunz, 83a  
   Trenton: Abbott (C C), 83  
   Vincentown: Goldsmith, 79  
   New York, Staten Island: Hollick, 04c, 05a, d, 06a, 08b  
   Santo Domingo: Sample, 05  
 Amblypoda, evolution: Osborn, 98e  
 Amboy clay series, age: Hollick, 98f  
 Amboy clays flora: Newberry, 95  
 American Association of State Geologists, field trip in Oklahoma: Hotchkiss, 17a  
 American geology: Emmons (E), 54  
 Ames Knob, North Haven, Me.: Willis, 03a  
 Amity folio, Pa. (no. 144): Clapp (F G), 07a  
 Amity quadrangle, economic geology: Clapp (F G), 07c  
 Ammonites. *See* Cephalopoda.  
 Amphibia.  
   Air-breathing Vertebrata, origin: Barrell, 16a  
   Alimentary canal of Carboniferous salamander: Moodie, 10  
   Amblypoda: Cope, 84y  
   American: Williston, 11  
   American Museum collection: Moodie, 09d

## Amphibia—Continued.

Amphibamus, Illinois: Cope, 66  
 Anatomy, intercentrum: Cope, 86h  
 Baphetes planiceps, Nova Scotia: Owen (R), 54, 55a  
 Broiliellus, Texas: Williston, 14b  
 Calamops, Triassic, Pennsylvania: Sinclair, 17  
 California, Rancho La Brea, Bufo: Camp, 17  
 Carboniferous: Dawson (J W), 63c; Hitchcock (C H), 68b; Moodie, 09b; classification, etc.: Moodie, 09a; distribution, etc.: Williston, 14d  
 \* Caudate amphibia, ancestry: Moodie, 08a  
 Clasping organs: Moodie, 08d  
 Coal Measures: Moodie, 15b, 16  
 Coal swamps amphibians: Matthew (W D), 11c  
 Cricotus, distribution: Case, 15d  
 Crossopterygian ancestry: Gregory (W K), 13  
 Dendrerpeton, South Joggins, N. S.: Dawson (J W), 63c, 91a  
 Derivation: Moodie, 15b  
 Development and geologic relations: Case, 98  
 Devonian, Pennsylvania, footprints: Marsh, 96d  
 Diplocaulia, Texas: Moodie, 12  
 Diplocaulus: Broili, 02; Huene, 12a; Williston, 09; structure and relationships: Douthitt, 17a  
 Dissorophus, Texas Permian: Cope, 95i; Williston, 10a; synonymy: Moodie, 08c  
 Eryops: Cope, 88e; Huene, 12  
   limbs: Gregory (W K), 11  
   Oklahoma: Williston, 99c  
   Permian, Tex.: Broili, 99  
 Eryopsoides, Permian, New Mexico: Douthitt, 17  
 Eurythorax: Hussakof, 16  
 Footprints: King (A T), 45, 45a; Matthew (G F), 03c  
   Mississippian, Virginia: Branson, 10  
   Schuylkill Co., Pa.: Mason, 78  
 Frogs: Moodie, 14a  
 Ganocephala, Permian: Cope, 80j  
 General: Cope, 71k, 75d, 80m; Dawson (J W), 95a; Moodie, 09, 11, 15a  
 Geographic distribution: Moodie, 15d  
 Hylonomus, South Joggins, Nova Scotia: Dawson (J W), 91b  
 Hylopus: Matthew (G F), 04b  
 Ichthyacanthus: Moodie, 15c  
 Ichthyacanthus platypus, Coal Measures, Ohio: Moodie, 15e  
 Illinois: Hay (O P), 00  
   Carboniferous, Mazon Creek: Moodie, 10a, 11b, 12b, 13a  
 Jurassic frog, Wyoming: Moodie, 12c  
 Labyrinthodon: Warren, 56  
 Labyrinthodont, Kansas: Moodie, 10b, 11a; Williston, 97i  
   Newark series: Sinclair, 17a  
 Labyrinthodontidae: Branson, 05a  
 Lateral line system: Moodie, 08  
 Linton fauna, environment: Case, 17  
 List of described species: Moodie, 14  
 Lysorophidae: Moodie, 09  
 Lysorophus, Permian urodele: Williston, 08c  
 Lysorophus tricarinatus, skull of: Case, 08



**Amphibia—Continued.**

- Mandible, primitive structure: Williston, 13a  
 Manitoba, Cedar Lake: Tyrrell, 91a  
 Massachusetts, Plainville, vertebrate footprints: Woodworth, 00  
 Methods of study: Moodie, 15  
 Metoposaurus, Triassic, Arizona: Lucas (F A), 04  
 Microsauria: Moodie, 09c  
 Missouri, Kansas City, footprints: Butts, 91  
 Montana, Judith River and Fox Hills: Cope, 77e  
 Nebraska, Tertiary: Cook, 17  
 New Brunswick, Little River group: Matthew (G F), 10c  
 New Mexico, Permo-Carboniferous: Case, 13a; Permian: Cope, 81z  
 Nova Scotia, Carboniferous: Dawson (J W), 60a, 63, 70g, 76a, 82, 94f; Matthew (G F), 05  
 Joggins: Agassiz (L), 62a; Marsh, 62, 62a; Owen (R), 62  
 Ohio, Linton, Carboniferous: Cope, 71p, 73z, k, 75e, h, m, 77h, 85g, 97; Wyman, 57b, 58  
 Osteology: Williston, 16  
 Paleozoic footprints, classification: Matthew (G F), 03a  
 Pennsylvania: Cope, 97  
 Pittsburgh: Case, 08b  
 Pottsville, footprints: Lea, 49  
 Permian: Case, 11a, b; Cope, 78zf, 84l, 88c; Williston, 08e, 18a  
 Texas: Case, 03a  
 Pleuroptyx, Iowa: Udden, 02c  
 Quadrupeds, dawn of, in North America: Moodie, 08b  
 Rachitomus: Cope, 78zc, 82r  
 Sauropleura: Cope, 71r  
 Scaled amphibia, Coal Measures: Moodie, 15g  
 Skull elements, Permian Tetrapoda: Huene, 13a  
 Sphenodon, intercentrum: Cope, 86k  
 Stegocephala: Baur, 96a; Broom, 13c; Moodie, 09; Texas, Permian: Broili, 04, 13  
 Synopsis: Cope, 68i, 70  
 Ten years' progress: Case, 12  
 Tetrapoda, origin: Gregory (W K), 15  
 Permian: Williston, 16a  
 Texas, Permian: Broili, 04, 13; Case, 10a; Cope, 78l, 81, 81f  
 Trematops, Permian: Williston, 09b  
 Trimerorhachis, Texas: Williston, 15, 16b  
 Wyoming, Green River shale: Cope, 73zg  
 Zatrachys Cope: Case, 07d
- Amphiboles**, optical study: Ford (W E), 14  
**Amphibolites** of the Laurentian area: Adams (F D), 09a  
**Amphictis**: Riggs, 98  
**Amphicyon**: Wortman, 01  
**Amphineura**.  
 Pennsylvania, Allegheny and Conemaugh faunas: Raymond (P E), 10c  
 Amsden formation, Wyoming: Branson, 18  
 Amyzon: Lambe, 06f  
 Analcite, Foote (H W), 12  
 Analyses, average: Mead (W J), 14  
 Analyses of rocks: Clarke (F W), 97; Egleston, 74

- Analysis of silicate and carbonate rocks: Hillebrand, 07  
 Analysis of water: Dole, 11  
 Anamorphism: Leith, 15a  
 Anatexis: Sederholm, 13a  
 Anchiceratops, Alberta: Brown (B), 14a  
 Anchisaurus: Marsh, 92e; restoration: Marsh, 93b  
 Ancodus: Scott, 95  
 Angistorhinus: Mehl, 13  
 Angle of shear: Dahlblom, 14  
 Anguilla.  
*Historical geology*.  
 General: Spencer (J W), 01b  
*Paleontology*.  
 Echinoidea: Cotteau, 74, 75; Lambert (J), 15  
 Vertebrata: Cope, 71j, 83  
 Angulation of limbs: Osborn, 00e  
 Anhedron: Pirsson, 96a  
 Anhydrite, origin: Rogers (A F), 12c; Jones (J C), 12a  
 Animikie. *See* Pre-Cambrian.  
 Animikie iron range, Ontario: Silver, 06  
 Ankylosauridae: Brown (B), 08c  
 Ann Arbor folio, Mich. (no. 155): Russell, (I C), 08  
 Anne Arundel Co., Md.: Little, 17  
 Annelid jaws, Ontario: Hinde, 79a  
 Annelida.  
 Autodetus, New York: Clarke (J M), 94e  
 Cambrian: Walcott, 10  
 Conchicolites: Nicholson, 72a, 74j  
 General: Clarke (J M), 93a  
 Habits: Miller (S A), 80b  
 Iowa, Devonian: Calvin, 88  
 Nereidavus: Grinnell, 77  
 New York: Hall, 88  
 Ortonia: Nicholson, 72d, 74j  
 Anomalodonta, synonym for Megaptera: White (C A), 74a  
 Anomalous dips: Shaw, 18d  
 Anoplomassa: True (F W), 07a  
 Anorthosite body in Adirondacks: Cushing, 17  
 Anorthosites of Canada: Adams (F D), 96a  
 Antelope district, Nev.: Schrader, 13  
 Antelope Valley, Cal.: Johnson (H R), 11  
 Anthozoa (corals).  
 Arctic Islands: Lambe, 06  
 Acervularia: Calvin 92  
 Alveolites: Nicholson, 77; Say, 19  
 Antigua: Duncan, 64  
 Antiquity of zoanthid actinians: Duerden, 04b  
 Aphyllostylus, Silurian, Manitoba: Whiteaves, 04b  
 Archaeocyathus: Hinde, 88b, 89a  
 Arkansas, Fayetteville shale fossils: Girty, 10a  
 Bahamas: Vaughan, 16b  
 Barretia: Whitfield, 97c  
 Calceola, Tennessee: Safford, 60a  
 Calceolidae, Kentucky: Lyon, 79  
 California, Carrizo Creek: Vaughan, 17  
 Campophyllum, Kansas: Beede, 98e  
 Canada, Madreporaria and Alcyonaria: Lambe, 99  
 Madreporaria Aporosa and Rugosa: Lambe, 01  
 Paleozoic: Lambe, 99b  
 Carboniferous coral, Craterophyllum verticillatum: Barbour (E H), 11a  
 Caribbean area: Gregory (J W), 95



## Anthozoa (corals)—Continued.

- Carinae upon septa of rugose corals: Holmes (M E), 87  
 Caryophyllia, California: Vaughan, 00c  
 Chonophyllum: Sherzer, 92  
 Cincinnati: Foerste, 09c  
 Colorado, Cretaceous: White (C A), 79b  
 Columnopora, Ordovician: Nicholson, 74i  
 Crepidophyllum: Nicholson, 78b  
 Cretaceous and Tertiary, California and Oregon: Nomland, 16  
 Cyathophyllidae: Dana, 46  
 Cyathophyllum, Niagara, Jones Co., Iowa: Thomas (A O), 17  
 Cystiphyllum, Devonian: Nicholson, 75f; Ohio and Ontario: Nicholson, 75f  
 Development stages: Grabau, 09d  
 Devonian: Greene (G K), 98; Schuchert, 03c  
   Ontario: Billings, 59f  
   Wisconsin: Cleland, 11  
 Diphyphylloid corals: Chadwick, 17d  
 Diphyphyllum: Sherzer, 89  
 Duncanella, Silurian, Indiana: Nicholson, 74f  
 D'Orbigny's types figured: Boule, 06  
 Early stages, Paleozoic corals: Gordon (C E), 05  
 Ellesmere Land, Devonian: Loewe, 13  
 Eocene, Atlantic Coastal Plain: Lonsdale, 45b  
   nomenclature: Vaughan, 03b  
   Virginia: Vaughan, 95b  
 Eocene and Oligocene: Vaughan, 00a  
 Ethmophyllum Silurian, Nevada: Meek, 68b, d  
 Evolution: Brown (T C), 15a  
 Favistella: Nicholson, 75o  
 Favosites, development: Girty, 95; Devonian, Ontario: Nicholson, 73d  
 Favositidae, development: Beecher, 93b  
 Florida: Vaughan, 16b  
 Georgia, Bainbridge: Vaughan, 00e  
 Glyphastraea, Tertiary, Maryland: Duncan, 87  
 Guadalupian fauna: Girty, 08  
 Hadrophyllum aplatus: Cummins, 91  
 Halysites, Iowa: Whitfield, 03a  
 Heliophyllum: Nicholson, 78b  
 Hindeastraea, Cretaceous: White (C A), 88f  
 Indiana, Cincinnati series: Cumings, 08  
   Franklin Co.: Moore (D R), 86  
   Niagaran and Devonian: Hall, 83i  
   Salem limestone: Beede, 06, 06a  
 Iowa, Devonian, Pachyphyllum: Webster, 05c  
 Jamaica, Clarendon district: Duncan, 65  
   Cretaceous and Tertiary: Duncan, 65; Vaughan, 99  
   Tertiary: Moore (J C), 63  
 Kansas, Carboniferous: Beede, 98c  
 Kentucky, Silurian: Foerste, 06; and Devonian: Davis (W J), 85  
 Lichenaria: Sardeson, 99b  
 Macgeea, Devonian, Iowa: Webster, 89b  
 Madreporaria, morphology: Duerden, 02a, b, 03, 04, 05, 06a  
 Madreporaria Fungida: Vaughan, 05  
 Maryland, Eocene: Vaughan, 02c; Pleistocene: Clark (W B), 06b  
 Michigan: Rominger, 76b; Calamopora: Rominger, 62a  
 Micrabacia, Upper Cretaceous: Stephenson, 16

## Anthozoa (corals)—Continued.

- Minnesota, Ordovician: Winchell (H H), 95b  
 Miocene: Lonsdale, 45a  
 Moniloporidae: Grabau, 99a  
 Morphology and development: Duerden, 04a, 05a  
 Neocene: Gane, 95, 00  
 New genera: Hall, 51e  
 New Hampshire, Littleton: Hitchcock (C H), 72b  
 New Jersey, Timber Creek: Lonsdale, 45  
 New York, Devonian: Hall, 76a, 87  
   Helderbergian: Hall, 74a, 79b  
   Lower Helderberg: Hall, 83b  
 Niagaran and Helderbergian: Hall, 84f  
 Ohio, Dayton region: Van Cleve, 49  
   Maxville limestone fauna: Morse, 11  
   Silurian and Devonian: Nicholson, 75a  
 Ontario, Ordovician: Billings, 56e  
 Pachyphyllum: Webster, 89a  
 Pacific coast: Nomland, 17  
 Palaeacis: Meek, 67f; Illinois: Nicholson, 78c  
 Paleozoic: Nicholson, 75n, 77c  
   classification: Chapman, 93a  
   development: Anderson, 07, 07a  
   early stages: Brown (T C), 07; Gordon (C E), 06  
   tabulate corals: Verrill, 72  
 Phillipsastrea: Calvin, 93b  
 Platytrochus speciosus: Vaughan, 02d  
 Pleurodictyum: Rominger, 63; development: Beecher, 93a  
 Porto Rico: Vaughan, 02  
 Prionastraea vaughani, Eocene, Alabama: Gregory (J W), 99a; Vaughan, 01a  
 Romingeria: Beecher, 03; Sardeson, 03a  
 Rugosa: Brown (T C), 09, 15; Duerden, 02, 04c; Sherzer, 91; Simpson (G B), 00  
 Santo Domingo: Gabb, 75a; Lonsdale, 53  
 Septa in rugose corals: Duerden, 06; Gordon (C E), 07  
 Septal development and sequence, Paleozoic corals: Duerden, 02d, 03a  
 Septastraea (Glyptastraea), Tertiary, Maryland and Virginia: Hinde, 88a  
 Silurian, Kentucky: Foerste, 06, 09; Ohio, Indiana, and Kentucky: Foerste, 09  
 Sphaerolites, Dalhousie, N. B.: Hinde, 75  
 Streptelasma: Hall, 97d; Sardeson, 97a  
 Streptelasma rectum Hall, developmental stages: Brown (T C), 07  
 Stylina collinsi, Mexico: Gregory (J W), 99a  
 Sutton Jurassic of Vancouver Island, B. C.: Clapp (C H), 11a  
 Syringolites, Manitoulin: Hinde, 79b  
 Syringolites and Roemeria: Nicholson, 89  
 Tabulate corals: Nicholson, 79; affinities: Lindström, 76; Verrill, 68; relations to Alcyonaria: Sardeson, 96c  
 Tertiary: Conrad 35b; Dana 47c; Lonsdale 47  
   history: Vaughan, 17  
   West Indies: Duncan, 73  
 Tetracoralla, relationship to Hexacoralla: Robinson (W I), 17  
 Tetradium: Nicholson, 77b  
 Tetradium cellulosum, development: Ruedemann, 98b



## Anthozoa (corals)—Continued.

- Tetrastepata, classification: Grabau, 16b  
 Texas, Buda limestone, corals: Vaughan, 03  
 Trochocyathus, Cretaceous, New Jersey: Vaughan, 00d  
 Tumularia: Robinson (W I), 16  
 Van Cleve's fossil corals: Hall, 83h  
 West Indies: Duncan 63; Vaughan 01; nomenclature: Vaughan, 02b  
 Zaphrentis, fission: White (C A), 73a; revision: O'Connell, 14

## Anthracaridae: Packard (A S), 86b

## Anthracite.

- Alberta: Dodge, 88  
 Classification: Ashburner, 86i  
 Formation: Gresley, 93b  
 General: Kemp, 03c  
 History: Lippincott, 83  
 Hudson Bay region: Bell (R), 96b  
 Origin: Bunker, 33; Emmons, 59b; Gresley, 96; Hardman, 76; Hunt, 80g; Jackson, 59d; Keyes, 94g; Rogers, 43b  
 Pennsylvania: Ashburner, 81b, 83, 83a, b, d, 84, 84a, b, d, 85  
   origin: Stevenson, 93, 95a  
   southern field: Haertter, 08  
   Wilkes-Barre: Cist, 21a  
 Rhode Island: Ashley, 14, 15; Brown (C W), 10a; Johnson (W R), 41d  
 Rocky Mountains: Hosea, 98  
 Western States: Newberry, 71j

## Anthracite-Crested Butte folio, Colo. (no. 9): Eldridge, 94

## Anthraxo'ite, composition: Ellis, 97

## Anticlinal and hydraulic theories of oil and gas accumulation: Munn, 09a

## Anticlinal theory of oil and gas accumulation: Clapp (F G), 09a; White (I C), 92

## Anticlinorium: Rice (W N), 06b

Anticosti Island. *See* Quebec.

## Anticyclones above continental glaciers: Hobbs, 15b

## Antigorite, genesis: Julien, 14

## Antigua.

- General: Brown (A P), 14; Guppy, 11, 12, 12a; Nugent, 21; Spencer (J W), 01; Watts, 12

*Historical geology.*

- General: Brown (A P), 14; Duncan, 64; Guppy, 11; Hovey (S), 38a; Nugent, 18; Purves, 73, 85; Spencer (J W), 01; Vaughan, 14f

*Paleontology.*

- Corals: Gregory (J W), 95  
 Echinids: Lambert (J), 15  
 Fresh-water mollusks, Oligocene: Brown (A P), 14a  
 General: Purves, 73  
 Zebrasoma deani: Hussakof, 07

*Underground water.*

- General: Tempany, 14; Vaughan, 14f

## Antillean continent: Spencer (J W), 98h; reconstruction: Spencer (J W), 94

Antilles. *See* West Indies.

## Antimony.

- Alaska: Brooks, 16a  
   Fairbanks district: Mertie, 17a  
   Seward Peninsula: Smith (P S), 08  
 Arkansas: Dunnington, 78; Hess, 08c; Shriver, 17; Wait, 80; Williams (C P), 75

## Antimony—Continued.

- British Columbia, Atlin district: Cairnes, 13;  
   Bridge River area: Drysdale, 16  
 California: Aubury, 06; Boalich, 18a  
 Canada: McLeish, 10, 14; Young (G A), 09  
 General: Bastin, 18b; Joseph, 16c; U S G S, 83  
 Idaho, Coeur d'Alene district: Brainard, 16  
 Mexico: Flores, 16a  
   Durango: Rangel, 11  
   El Altar, Sonora: Halse, 94  
   Fresnillo: Amador, 16  
 Nevada, Arabia district: Knopf, 18b  
 New Brunswick: Ells, 08a  
 Nova Scotia, Hants Co., West Gore: Askwith, 01; Haley, 09  
 Quebec, southern: Dresser, 09c, 10b, c  
 Utah, southern: Richardson (G B), 08a  
 Yukon: Cairnes, 10c; Wheaton River: Cairnes, 11a, 12

Anvik-Andreafski region, Alaska: Harrington, 18  
 Apache district, N. Mex.: Wade (W R), 14

## Apatite: Wilber, 83a

- Association with magnetite: Blake (W P), 93a  
 Canada: Dawson (G M), 84b; Hoffmann, 79; McNairn, 10; Young (G A), 09

## Occurrence in Laurentian rocks: Hunt, 86d

## Ottawa district: Dawkins 84; Kinahan (G A), 85

## Quebec, Emerald mine: Stansfield, 13

## Haliburton and Bancroft areas: Adams (F D), 10d

## Ottawa Valley: Stansfield, 12

## Virginia: Watson, 07e, 13g

## Aphrolith and dermolith: Jaggar, 17c

## Apishapa folio, Colo. (no. 186): Stose, 12

## Apishapa quadrangle, dike rocks: Cross, 14

## Appalachia, Paleozoic: Willis, 00

## Appalachian coal fields: Rogers, 43b

## Appalachian drainage: Campbell (M R), 96b

## Appalachian oil field: Fuller, 17

## Appalachian oil field brines: Richardson (G B), 17a

## Appalachian oil fields, dry sands: Reeves, 17; Shaw, 17f

## Appalachian peneplains, age: Shaw, 18a

## Appalachian region, denudation and erosion: Glenn, 11

## Appalachian region of Canada: Termier, 13

## Appalachian structure: Keith, 95a; mechanics of: Willis, 93b

## Appalachian system: Hunt, 71a

## Appalachians: Guyot, 61; Hunt, 75; Rogers (H D), 50c; Shaler, 77f

## materials: Claypole, 87a

## newer and older: Emerson, 13

## northern: Willis, 95

## physiography: Chickering, 82

## southeastern: Hunt, 74j

## southern: Hayes, 95f, 99e; Keith, 96c, 02; age: Bradley, 75; Elliott (J B), 83; geomorphology: Hayes, 94f

## structure: Lebling, 14; Rogers (H D), 43c, Rogers (W B), 43

## Appomattox formation: McGee, 88a, 90, 91i

## Apternodus skull: Matthew (W D), 10

Arachnida. *See also* Eurypterida.

## Arthrolycosa: Beccher, 89b

## Carboniferous: Scudder, 90f

## General: Dawson (J W), 85b



## Arachnida—Continued.

- Illinois, Mazon Creek: Harger, 74  
 Nova Scotia, Carboniferous: Scudder, 95a  
 Palaeophonus, New York: Whitfield, 85d  
 Paleozoic: Scudder, 85c; terrestrial: Petrunkevitch, 13  
 Proscorpius: Thorell, 86; Waterville, N. Y. Whitfield, 85a  
 Proscorpius osborni: Fritsch, 07  
 Silurian scorpion: Whitfield, 86c  
 Spiders: Scudder, 82d  
 Tertiary, Florissant, Colo.: Cockerell, 07e  
 Xiphosuran, Permian, Kansas: Beccher, 04  
 Araeoscelis, Texas, Permian: Williston, 14c  
 Aragoite, Cal.: Hanks, 05  
 Araucarias from western Cretaceous: Wieland, 10  
 Arbuckle Hills, Ind. T.: Vaughan, 99a  
 Archaeotherium: Leidy, 50  
 Archaeozoon: Dawson (J W), 97b; Matthew (G F), 07b  
 Archean. *See also* Pre-Cambrian.  
 Alabama: Smith (E A), 75  
 Antilles: Frazer, 90a  
 Arctic regions: Dawson, 87a  
 Arizona, Grand Canyon: Noble, 16  
 California, Sierra Nevada: Turner, 96, 96b  
 Canada: Coleman, 02e; Lawson, 90a, b; Vennor, 77; eastern: Ells, 97a  
 Classification: Coleman, 02e; Wadsworth, 92  
 Colorado, Denver region: Eldridge, 89  
 Needle Mountains quadrangle: Cross, 05b  
 Palmer Lake: Cannon, 95a  
 Perry Park: Cannon, 91a  
 Pueblo quadrangle: Gilbert, 97  
 Silverton quadrangle: Cross, 05  
 southern: Stevenson, 81  
 Tenmile quadrangle: Emmons (S F), 98  
 Walsenburg quadrangle: Hills, 00  
 Cordilleran region: King (C), 78a  
 District of Columbia: Darton, 01  
 General: Dana (J D), 92; Frazer, 88a, c; Heneage, 06; Hicks (H), 85; Van Hise, 92, 96, 99; Winchell (A), 90a; Winchell, 03e  
 Georgia, northern: Galpin, 15  
 Granitoid areas in Laurentian: Hitchcock (C H), 90a  
 Great Lakes region: Winchell (A), 90a  
 Huronian: Winchell (A), 91a  
 Igneous rocks, origin: Winchell (N H), 98e  
 Kawishiwin agglomerate, Minnesota: Winchell (N H), 92e  
 Lake Superior region: Irving, 85a, 87; Lawson, 90d  
 Maryland: Williams (G H), 88c; Washington quadrangles: Darton, 01  
 Michigan: Van Hise, 99  
 Crystal Falls district: Clements, 99  
 Menominee quadrangle: Van Hise, 00  
 Minnesota: Hall (C W), 99b; Winchell (N H), 98a, 00, 00a; greenstone: Winchell (N H), 98i  
 Missouri: Haworth, 88  
 Montana, Little Belt Mountains: Weed, 99a  
 southwestern: Douglass, 05a  
 Three Forks quadrangle: Peale, 96  
 New Jersey: Britton (N L), 87a  
 New Mexico, northern: Stevenson, 81

## Archean—Continued.

- New York, southeastern: Britton (N L), 87a  
 Nomenclature: Lane, 94a  
 North Carolina, Asheville quadrangle: Keith 04  
 Cranberry quadrangle: Keith, 03  
 Greenville quadrangle: Keith, 05  
 Mount Mitchell quadrangle: Keith, 05a  
 Northwest: Irving, 85b; Winchell (A), 89g  
 Nova Scotia, Cobequid Mountains: Honeyman, 81a  
 Halifax and Colchester cos.: Honeyman, 83b  
 Halifax Co.: Hare, 81  
 Ontario, Lake Superior region: Lawson, 91b;  
 Rainy Lake: Lawson, 12a, 13d  
 Questionnaire: Frazer, 87  
 South Dakota, Black Hills: Carpenter (F R), 88; Newton, 80; Todd, 95  
 Structure: Lawson, 86  
 Tennessee, Greenville quadrangle: Keith, 05  
 Texas: Harrod, 88  
 Utah, Wasatch Mountains: Geikie (A), 80  
 Virginia, Washington quadrangles: Darton, 01  
 Wisconsin, central: Irving, 77  
 eastern: Chamberlin, 77a  
 Flambeau Valley: King (F H), 82  
 Wyoming, Absaroka quadrangle: Hague, 99b  
 Yellowstone National Park: Hague, 96  
 Archean axes: Dana, 90e  
 Archelon, South Dakota: Wieland, 00, 02, 03  
 Archeocyathus: Hinde, 89a; Meek, 68d; Walcott, 87a  
 Archosauria: Huene, 14  
 Arctic regions.  
 Baffinland: Bell (R), 97c  
 Davis Strait and Baffin Bay: Sutherland, 53  
 Frobisher Bay: Egleston, 63a  
 General: Ekblaw, 18a; Etheridge, 74; Fitton, 36; Gregory (J W), 97; Jameson, 31; Low, 05; McClintock, 57; McCulloch, 19; Meyer (O E), 11; O'Neill, 16; Ross, 35; Schei, 03; Young (G A), 10b; Anon, 30  
 Peel River: Isbister, 45  
 Report Arctic expedition, 1908-9: Lambe, 10; McMillan, 10  
*Economic geology.*  
 Copper: O'Neill, 16, 17; Tyrrell, 12  
 General: O'Neill, 16  
*Historical geology.*  
 Coast, Demarcation Point to Mackenzie River: O'Neill, 15  
 Davis Strait and Baffin Bay: Sutherland, 53  
 Ellesmere Land: Hortedahl, 14, 17; Schei, 04  
 Cambro-Ordovician beds of Bache Peninsula: Hortedahl, 13  
 Devonian: Kiaer, 15  
 General: Dawson (G M), 87a; De Rance, 75, 76, 78; Feilden, 78; Gregory (J W), 97; Haughton, 59; Isbister, 55; Jameson, 26, 31; Konig, 24; Low, 05; Murchison, 55, 57; O'Neill, 16; Schei, 04  
 Grinnell Land: Feilden, 77, 78; Hortedahl, 17  
 Tertiary: Heer, 79a  
 Trenton, Baffin Land: Schuchert, 00  
*Mineralogy.*  
 Baffin Land: Walker (T L), 15a  
 Catalog of minerals: Giesecke, 61



## Arctic regions—Continued.

*Mineralogy*—Continued.

Tourmaline, Macdonald Island, Baffin Land:  
Ledoux, 18b

*Paleontology*.

Arctosaurus: Adams (A L), 75  
Baffin's Bay region: Salter, 52  
Beechey Island, Silurian: Woodward (H), 78  
Carboniferous: Salter, 55; Whitfield, 08  
Ellesmere Land: Hortedahl, 14, 17; Nathorst,  
04  
Devonian, Brachiopoda: Meyer, 13; corals:  
Loewe, 13; fishes: Kiaer, 15  
Frobisher Bay and Field Bay: Emerson, 79  
General: Haughton, 57; Konig, 24  
Greenland, Plantae: Heer, 62  
Grinnell Land: Hortedahl, 17  
Ichthyosaurus: Belcher, 56; Owen (R), 55  
König Oscar and Heiberg Land, Carboniferous:  
Tschernyschew, 16  
Mammalia, Eschscholtz Bay: Richardson (J),  
54  
Nuphar: Fritel, 14  
Ordovician, Boothia Felix and King William  
Land: Hortedahl, 12  
Paleozoic: Etheridge, 78; Haughton, 60; Kin-  
dle, 96b; Schuchert, 14f; Whitfield, 00a  
Plantae: Dawson (J W), 79a; Heer, 68; Saporta  
68  
Ellesmere Land: Nathorst, 15  
Grinnell Land: Heer, 78, 79.  
Miocene: Gardner (J S), 79; Heer, 67b, 79a  
Pleistocene, Baffinland: Kindle, 97  
Post-Tertiary: Jeffreys, 77  
Silurian: Salter, 52, 53  
Frobisher Bay: Stevens, 63  
Kennedy Channel: Meek, 65d  
Silurian and Carboniferous: Lambe, 10  
Trenton, Baffin Land: Schuchert, 00  
Triassic, Eureka Sound: Kittl, 07  
Wood, fossil, Banks Land: Cramer, 68

*Petrology*.

Baffin Land, Cumberland Sound: Bell (R), 87b  
Fram Expedition collections: Bugge, 10  
Frobisher Bay and Field Bay: Emerson, 79  
General: Jameson, 26

*Physical geology*.

Baffin Land, recent elevation of southern coast:  
Watson, 97  
Recent elevation: Howorth, 73

*Physiographic geology*.

Baffinland: Boaz, 88  
Crystosphenes: Tyrrell, 04  
Ellesmere and Grinnell lands: Hortedahl, 17  
General: Nansen, 04; Spencer (J W), 05a  
Glaciation: Muir, 84, 17

Arctic sea ice: Tarr, 97j

Arctotherium from Pleistocene of Yukon: Lambe,  
11

Arcuate mountains, formation of: Hobbs, 14a

Argillite: Eaton (A), 29

Arid region, western United States: Powell, 78

Arietidae, genesis: Hyatt, 89

Arisaig-Antigonish district, N.S.: Williams (M Y)  
11, 12

## Arizona.

Agatized wood: Kunz, 85

Bibliography: Lutrell, 15

Bisbee district: Ransome, 06b

Colorado River of the West: Powell, 73, 74

Dragoon Mountains: Bagg, 04b

General: Becker, 85; Blake (W P), 56a, 98, 99,  
04; Emmons (S F), 93; Gilbert, 74a;  
Loew, 80; Marcou, 55; Rath, 85

Mexican boundary: Emory, 57a; Schott, 57a

Navajo Reservation: Gregory (H E), 10

Petrified forests: Briscoe, 14; Byers, 05; Carter  
(O C S), 04; Dickinson, 87; Knowlton,  
13b; Kunz, 85, 86b; Merrill (G P), 11a, 13c;  
Miller (S A), 94d; Osborn, 02f; Ward  
(L F), 00a, d; Williams (F E), 13

Phoenix region: Vacher, 13

Red Mountain: Atwood, 06

Southern Ariz.: Parry, 57; Tolman, 12d

Tucson: Blake (W P), 08c

*Economic geology*.

Alunite, Patagonia: Schrader, 13a, 14

Anthracite: Griffith, 06

Antimony: Joseph, 16c

Asbestos: Joseph, 15b; Pratt, 05a; Grand Can-  
yon region: Diller, 11

Banner mining district, Gila Co.: Brooks (E W),  
07

Bisbee district: Brinsmade, 07c; DeWilde, 15;  
Notman, 13; Ransome, 04, 04b, 06b; To-  
vote, 11; Weed, 12d

Bradshaw Mountains quadrangle: Jaggar, 05

Buckskin Mountains: Blanchard, 13

Building stone: Culin, 16e

Calizona placers: Hedburg, 09

Castle Creek district, Yavapai Co.: Blauvelt, 96

Castle Dome lead district: Nevius, 12

Celestite: Phalen, 14

Cement materials: Culin, 16c; Duryee, 03;  
Eckel, 13

Cerbat Range and Black Mountains mineral  
deposits: Schrader, 08a

Cherry Creek district: Lindgren, 06h; Reid  
(J A), 06a, 07c

Chloride district: Comstock, 00

Cinnabar, occurrence: Bancroft (H C), 10

Clifton quadrangle: Lindgren, 05

Clifton-Morenci district: Lindgren, 05a; Tovote,  
10; enrichment: Burgess, 03; mineraliza-  
tion: Reber, 16

Coal: Griffith, 06; Rubel, 16a

Black Mesa field: Campbell (M R), 11c

Carboniferous: Dumble, 02c

Deer Creek field: Campbell (M R), 04b;  
Devereaux, 81; Walcott, 85c

Navajo Co.: Reagan, 11c; Veatch (A C), 11

Cochise district: Franke, 05; Kellogg, 06

Copper: Blake (W P), 59; Brinsmade, 07c;  
Ely, 16; Finlay, (J R) 18; Graichen, 05;  
Hatley, 07; Joseph, 16d; Merrill (F J H),  
07d; Ransome, 13; Rose, 11; Tolman, 10;  
Tovote, 12a; Weed, 06, 13a; Wendt, 87;  
Woodbridge, 06

Ajo district, Pima Co.: De Kalb, 18; Jorale-  
mon, 14



## Arizona—Continued.

*Economic geology—Continued.*

Copper: Banner district: Brooks (E W), 07  
 Bisbee: Brinsmade, 07c; De Wilde, 15a; Goodwin, 02; Notman, 13; Ransome, 03a, b, 04, 04b, c; Tenney, 14; Tovote, 11; Sacramento Hill deposit: De Kalb, 18a  
 Cherry Creek district: Reid (J A), 06a  
 Chiricahua Mountains: Badger, 11  
 Clifton: Henrich, 85; Lindgren, 05  
 Clifton-Morenci district: Lindgren, 03c, 05a, e; Reber, 16; Tovote, 10  
 Cochise district: Kellogg, 06  
 Colorado Plateau: Blandy, 97a  
 Colorado River region: Hately, 07  
 Copper Basin, Yavapai Co.: Blake (W P), 89  
 Copper Butte: Probert, 12  
 Copper Creek district: Hafer, 14; Higgins (E), 11; Martin (A H), 10a; Sibley, 09  
 Courtland district: Dinsmore, 10  
 detrital deposits: Tovote, 17  
 Globe district: Graichen, 05; Ransome, 03, 04a, 10b; Sivyver, 09; Tovote, 14  
 Globe-Kelvin districts: Higgins (E), 10  
 Grand Canyon region: Emmons (S F), 05a  
 Grand Gulch region: Hill (J M), 14b  
 Jerome district: Finlay (J R), 18a; Provot, 16; Rice (M), 18; Rickard, 18  
 Johnson and Dragoon districts: Dinsmore, 09a  
 Kaibab Plateau: Jennings, 04  
 Kofa Mountains: Jones (E L), 15a  
 Miami copper mine: Herrick (R L), 09c, 10; Loveman, 12  
 Miami-Inspiration copper-ore zone: Tolman, 09d  
 Mohave Co.: Schrader, 08a, 09  
 Morenci: Henrich, 87a  
 Morenci-Metcalf district: Butler (B S), 12  
 Oro Blanco district: Milton, 13  
 Patagonia district: Probert, 14; Schrader, 17a  
 Pima Co.: Tolman, 16a  
 Pinal Co.: Hill (A), 00  
 Planet mines, Bill Williams Fork: McCarn, 04  
 porphyry deposits: Tovote, 12a; Weed, 13a  
 Ray district: Herrick (R L), 09b; Tolman, 09c; Truesdell, 09; Weed, 11a  
 Santa Rita district: Schrader, 17a  
 Silverbell district: Stewart (C A), 12; Tolman, 09e  
 southern Ariz.: Gilbert (J), 57; Merrill (F J H), 07d; Tolman, 09b  
 Stanley Butte district: Wolf, 10  
 Superior: Ransome, 14  
 Turquoise district: Ransome, 13a  
 Vekol district: Higgins (E), 11a  
 Warren district: Bonillas, 16  
 White Mesa district: Hill (J M), 14  
 Yuma Co.: Bancroft (H), 11; Higgins (E), 10, 10a  
 Copper Queen mine: Douglas, 99  
 Courtland district: Dinsmore, 10  
 Cunningham Pass district: Tovote, 18  
 Diatomaceous earth: Blake (W P), 03b  
 Directory of minerals: Willis (C F), 15  
 Dragoon tungsten deposits: Richards (R W), 08

## Arizona—Continued.

*Economic geology—Continued.*

Fort Apache region: Reagan, 11e  
 Galiuro Mountains: Blake (W P), 02a  
 Garnet deposits, Navajo Reservation: Gregory (H E), 16b  
 Gems: Culin, 17a  
 General: Becker, 85; Blake (W P), 98, 98b, 99, 01, 04; Comstock, 95, 01; Parry, 69; Wheeler (G M), 72  
 Globe district: Ransome, 03, 04a, 10b; Graichen, 05; Tovote, 14  
 Gold: Carter (T L), 11, 12; McClure, 15; Pratt, 02g; Silliman (jr), 80a  
 Calizona: Hedburg, 09  
 Cerbat Range: Schrader, 08a  
 Cherry Creek district: Reid (J A), 06a  
 Globe district: Graichen, 05  
 Gold Road: Tovote, 06b  
 Greens Valley district: Hedburg, 09a  
 Kingman district: Weed, 10  
 Kofa Mountains: Jones (E L), 15a  
 Mohave Co.: Schrader, 09  
 Mohave region: Schrader, 16  
 Oro Blanco district: Milton, 13  
 Owl Head district: Pickard, 12a  
 Pinal Co.: Burgess, 03a  
 Quartzsite: Jones (E L), 15  
 Tombstone, Cochise Co.: Blake (W P), 02d; Brinsmade, 07d  
 Tom Reed-Gold Road district: Ritter, 16  
 Vulture mine: Purington, 07  
 Yuma Co.: Bancroft (H), 11; Fortuna mine: Blake (W P), 97b  
 Gold Road district, Kingman: Bancroft (H), 15  
 Grand Gulch region, Mohave Co.: Hill (J M), 14b  
 Greens Valley district: Hedburg, 09a  
 Gypsum: Blake (W P), 04d; Culin, 16b; southern Ariz.: Blake (W P), 96c  
 Iron: Blake, 65; Jones (C C), 10; Joseph, 16e hematite: Blanchard, 13  
 northern Ariz.: Blake (W P), 66e  
 Planet district: Upham (W E), 11  
 Yuma Co.: Bancroft (H), 11  
 Jerome district: Finlay (J R), 18a; Provot, 16; 16a  
 Johnson and Dragoon districts: Dinsmore, 09a  
 Kofa Mountains: Jones (E L), 15a  
 Kingman mining district: Weed, 10  
 Lead: Joseph, 16f  
 Bisbee district: Notman, 13  
 Castle Dome district: Nevius, 12  
 Mohave Co.: Schrader, 08a, 09  
 Mowry: Brinsmade, 07b  
 Patagonia district: Schrader, 17a  
 Santa Rita district: Schrader, 17a  
 Silverbell district: Stewart (C A), 12  
 Yuma Co.: Bancroft (H), 11  
 Lime rocks: Culin, 17  
 Manganese: Allen (M A), 18a; Joseph, 15; in unusual form: Blake (W P), 10  
 Mineral Hill district: Blauvelt, 89  
 Tombstone district: Goodale, 89  
 Magnesite: Culin, 16  
 Marble prospects in Chiricahua Mountains: Paige, 09a



## Arizona—Continued.

*Economic geology—Continued.*

Miami district: Herriek (R L), 10  
 Mica: Culin, 16a  
 Mineral resources: Blake (W P), 96, 97, 98, 99, 01, 02, 05; Comstock, 94; Willis (C F), 15a  
 Mineral Creek district, Pinal Co.: Gowing, 04  
 Mineral Hill district: Blauvelt, 89  
 Minerals, useful: Willis (C F), 16  
 Mining districts: Wheeler (G M), 72a  
 Miscellaneous minerals: Joseph, 17  
 Mohave Co.: Schrader, 09, 16, 16a; Tovote, 07  
 Molybdenite in Santa Rita and Patagonia Mountains: Schrader, 10a  
 Molybdenum: Joseph, 15a; Hualpai Mountains: Wickes, 17  
 Morenci-Metcalf district: Butler (B S), 12  
 Navajo country: Gregory (H E), 17  
 Nitrate deposits: Gale, 12  
 Oatman district: Palmer (L A), 16, 16a; Probert, 16; Ritter, 16  
 Oro Blanco district: Milton, 13.  
 Owl Head district, Apache mines: Pickard, 12a  
 Patagonia district: Dinsmore, 09; Probert, 14; Schrader, 17a  
 Patagonia Mountains: Schrader, 15  
 Pearce district: Endlich, 97  
 Petroleum, Tonto Basin district: Botsford, 13  
 Planet specular hematite deposits: Upham (W E), 11  
 Prescott district: Blandy, 83  
 Quicksilver: Bancroft (H C), 10; Joseph, 16  
   Mazatzal Range: Ransome, 15a  
   Phoenix Mountains: Schrader, 18  
   Yuma County: Bancroft (H), 11  
 Rio Colorado region: Silliman (jr), 66  
 San Francisco district: Martin (A H), 09  
 Santa Cruz Co.: Bird (A T), 16  
 Santa Cruz Valley: Blake, 01c  
 Santa Rita district: Schrader, 17a  
 Santa Rita Mountains: Schrader, 15, 15a  
 Silver: Blake (W P), 59; Bond, 10; Pumpelly, 63  
   Black Mountains: Schrader, 08a  
   Globe: Tovote, 13  
   Mohave Co.: Schrader, 09  
   Mowry: Brinsmade, 07b  
   Oro Blanco district: Milton, 13  
   Owl Head district: Pickard, 12a  
   Patagonia district: Schrader, 17a  
   Pinal region: Blake (W P), 83b  
   Santa Rita district: Schrader, 17a  
   Silverbell district: Stewart (C A), 12  
   Tombstone district: Shaw (S F), 09  
 Silver-bearing diorite: Bond, 10  
 Silverbell Mountains: Barney, 04  
 Silver King mine: Blake (W P), 83b  
 Slate: Dale, 06c  
 Stanley Butte district: Graham Co.: Wolf, 10  
 Tombstone, Cochise Co.: Blake (W P), 82, 02d, 04a; Brinsmade, 07d; Church, 82, 03; Goodale, 89; Lakes, 04c; Shaw (G F), 09  
 Tom Reed-Gold Road district: Ritter, 16; Sperr, 16  
 Tungsten: Blake (W P), 99b; Rubel, 16; Taft, 16; Willis (C F), 16a  
 Calabasas: Hill (J M), 10a

## Arizona—Continued.

*Economic geology—Continued.*

Tungsten: Cochise Co.: Richard (F), 04a  
 Dragoon: Richards (R W), 08  
 Whetstone Mountains: Hess, 09a  
 Turquoise, Mohave Co.: Frenzel, 98; Schrader, 08a  
 Turquoise mining district: Platt, 09  
 Vanadium: Joseph, 16a  
 Vekol district: Higgins (E), 11a  
 Verde district, Yavapai Co.: Miller (G W), 03b  
 Vulture mine: Purington, 06c  
 Warren district, Bisbee: Bonillas, 16  
 Washington Camp: Crosby, 05b  
 Wolframite, Cochise Co.: Blake (W P), 98f, 99c; Whetstone Mountains: Hess, 09a  
 Yavapai Co.: Blandy, 97, 98; Hillside mine: Storms, 90a  
 Yuma Co.: Bancroft (H), 11  
 Zinc: Joseph, 16b  
   Hualapai district: Gregory (N B), 10  
   Mohave Co.: Schrader, 08a, 09  
   Patagonia district: Schrader, 17a  
   Santa Rita district: Schrader, 17a  
*Historical geology.*  
 Bisbee district: Notman, 13; Ransome, 04, 04b, c, 06b  
 Black Mesa coal field: Campbell (M R), 11c  
 Bradshaw Mountains quadrangle: Jaggard, 05  
 Bright Angel quadrangle, geologic history: Noble, 18  
 Buckskin Mountains: Blanchard, 13  
 Carrizo Mountain: Emery, 16  
 Chloride district: Comstock, 00  
 Clifton quadrangle: Lindgren, 05  
 Clifton-Morenci district: Lindgren, 05a; Reber, 16  
 Cochise district: Franke, 05  
 Colorado River region: Lee (W T), 07e  
 Deer Creek coal field, White Mountain Indian Reservation: Walcott, 85c  
 Fort Apache region: Reagan, 03b  
 Galiuro Mountains: Blake (W P), 02a  
 General: Antisell, 56; Blake (W P), 98, 99, 01, 01a, 03, 04; Blandy, 93a; Comstock, 95, 01; Gilbert, 75a; Howell (E E), 75; Marcou, 54b, 56; Marvine, 75; Newberry, 61; Wheeler (G M), 72  
 Globe district: Ransome, 02a, 03, 04a, 10b, 11c; Tolman, 10a  
 Grand Canyon: Darton, 12d, 17b; Davis (W M), 01; Dutton, 81, 82, 82a; Frech, 95; Powell, 73a; Ransome, 08a, b; Salisbury, 02b; Walcott, 83c  
 Algonkian: Walcott, 95a  
 Archean complex, Granite George: Noble, 16  
 Cambrian: Schuchert, 18c  
 Carboniferous: Schuchert, 18b  
 Shinumo area: Noble, 10  
 Unkar terrane, pre-Cambrian: Walcott, 94  
 Great Basin, southern part: Weeks, 03a  
 Jerome district: Provot, 16, 16a; Rickard, 18  
 Kanab Valley: Walcott, 80  
 Kofa Mountains: Jones (E L), 15a  
 Little Colorado Valley: Gregory (H E), 14; Ward, 01  
 Mazatzal Range: Ransome, 15a



## Arizona—Continued.

*Historical geology*—Continued

- Mineral Creek district, Pinal Co.: Gowing, 04  
 Mohave Co.: Schrader, 16  
 Navajo country: Gregory (H E), 16a, 17  
 Northern Ariz.: Darton, 10a; Davis (W M), 93  
 Oatman district: Palmer (L A), 16a  
 Paleozoic and pre-Cambrian sections: Ransome, 08a  
 Paleozoic sections, correlation: Ransome, 16  
 Patagonia district: Schrader, 17a  
 Patagonia Mountains: Schrader, 15  
 Ray copper district: Truesdell, 09  
 Ray quadrangle: Ransome, 15b  
 Salt River valley: Lee, 05  
 San Franciscan volcanic field: Robinson, 13  
 San Simon Valley: Schwennesen, 17  
 Santa Rita district: Schrader, 17a  
 Santa Rita Mountains: Schrader, 15  
 Shinarump conglomerate: Gregory (H E), 13  
 Shinumo quadrangle: Noble, 14  
 Southeastern Ariz.: Dumble, 02  
 Southern Ariz.: Blake (W P), 01a; Cox (E T), 80b  
 Sulphur Spring Valley: Meinzer, 13; borings: Douglas, 01  
 Tombstone, Cochise Co.: Blake (W P), 02d; Church, 03  
 Tonto sandstone, age; Gilbert, 74e  
 Triassic portion of the Shinarump group: Cross, 08  
 Tumamoc Hills: Tolman, 09  
 Turquoise copper district: Ransome, 13a  
 Walnut Canyon: Shimer, 10  
 Warren district, Bisbee: Bonillas, 16  
 Western Ariz.: Lee (W T), 08a  
 Yuma Co.: Bancroft (H), 11

*Mineralogy*.

- Alabandite, Tombstone: Moses, 92, 93c  
 Anglesite, Castle Dome district: Brush, 73  
 Antimony: Joseph, 16c  
 Arizonite: Palmer (C), 09  
 Atacomite, Globe: Moses, 95  
 Azurite: Farrington, 91  
 Bisbee district: Friedrich, 89a; Koenig, 91; Ransome, 04b  
 Calcite, Bisbee: Hovey, 00b  
 Cerusite twin, Mammoth mine, Pinal County: Pogue, 13  
 Chrysocolla, Pinal Co.: Palmer (C M), 03  
 Clifton-Morenci district: Lindgren, 04e, 05a  
 Connellite, Bisbee: Ford (W E), 15a  
 Connellite and chalcophyllite from Bisbee: Palache, 09c  
 Copper crystals from Bisbee: Petereit, 07  
 Copper minerals: Joseph, 16d; Kunz, 85a  
 Cuprodescloizite, Bisbee: Wells (R C), 13a; Nogales: Headden, 03a  
 Delafossite from Bisbee: Rogers (A F), 13  
 Descloizite: Hillebrand, 89a  
 Directory of minerals: Willis (C F), 15  
 Dumortierite, Clip: Diller, 89a  
 Emmonsite, Tombstone: Hillebrand, 86  
 Ettringite, Tombstone: Moses, 93, 93b, c  
 Footeite: Koenig, 91a  
 General: Blake (W P), 09; Loew, 75a; Stone (G H), 01

## Arizona—Continued.

*Mineralogy*—Continued.

- Gerhardtite, Jerome: Wells, 85  
 Holbrook meteoric shower: Foote (W M), 12  
 Hübnerite: Blake (W P), 99b  
 Iodobromite: Blake (W P), 05c  
 Iron shale, analysis of: Farrington, 06b  
 Jarosite, Vulture mine: Penfield, 81  
 Melanochalcite, Bisbee: Hunt (W F), 16; Koenig, 02  
 Meteorites, Arispe: Farrington, 14  
 Canyon Diablo: Cohen, 92; Derby, 95; Foote (A E), 91, 92b; Keyes, 13n; Meunier, 16; Canyon Diablo: Moissan, 04  
 Coon Butte: Farrington, 06b; Mallet, 06  
 Holbrook: Merrill (G P), 12a  
 Tucson: Brush, 63c; Fletcher (L), 90; Genth, 55a; Whitney, 63c  
 Mineralogic notes: Guild, 11  
 Mineralogy of Ariz.: Guild, 10  
 Molybdenite, Wallapi Mountains: Garrison, 07c  
 Molybdite: Guild, 07  
 Paramelaconite: Koenig, 91, 91a  
 Patagonia Mountains: Schrader, 15  
 Pseudomorphs, malachite after azurite, Bisbee: Hills, 91a  
 Quartz, hollow: Kunz, 87h  
 Santa Rita Mountains: Schrader, 15  
 Shattuckite and bisbeeite: Schaller, 15a  
 Spangolite: Penfield, 90  
 Sundry minerals: Silliman (jr), 81a; Smith (W B), 88  
 Turquoise, Cochise Co.: Blake (W P), 83  
 Useful minerals: Willis (C F), 16  
 Vanadinite: Blake (W P), 81a; Bowman (H L), 03; Penfield, 86d; Silliman (jr), 81a  
 Pinal Co.: Blake (F H), 84  
 Silver district: Hills, 91  
 Tucson: Rath, 86a  
 Verde Valley: Blake (W P), 90c  
 Warren district, Bisbee: Bonillas, 16  
 Wolframite, Phoenix: Wherry, 14a
- Paleontology*.
- Araucarian plant from Triassic: Jeffrey, 10  
 Araucarioxylon: Knowlton, 88  
 Aubrey and Red Wall fossils: Reagan, 04b  
 Bos, Quaternary: Blake (W P), 98c  
 Carboniferous, Bisbee quadrangle: Girty, 04  
 Cretaceous, Bisbee quadrangle: Stanton, 04  
 Devonian, Bisbee quadrangle: Williams (H S), 04  
 Diatoms: Blake (W P), 03a  
 Dinosaur footprints: Riggs, 04a  
 Egg, fossil: Morgan, 04, 04a  
 Erethizon: Allen (J A), 04  
 Flora: Ward, 05  
 Footprints, Grand Canyon: Lull, 18b  
 Gastropoda, Mesozoic: Robinson (W I), 15  
 General: Newberry, 61  
 Invertebrata: White (C A), 74  
 Mammoth: Blake (W P), 00a  
 Metoposaurus, Little Colorado River: Lucas (F A), 04  
 Moorefield fauna: Reagan, 11b  
 Placerias, Little Colorado River: Lucas (F A), 04  
 Red Wall fossils: Reagan, 04b, c



## Arizona—Continued.

*Paleontology—Continued.*

- Silicified wood: Gordon (W T), 09
- Snails: Cockerell, 05a
- Tertiary freshwater Mollusca: Hannibal, 12
- Triassic Reptilia: Mehl, 15b
- Vertebrata, Triassic: Lucas (F A), 01f
- Woods, fossil: Platen, 08

*Petrology.*

- Archean complex, Granite Gorge, Grand Canyon: Noble, 16
- Bradshaw Mountains quadrangle: Jaggar, 05
- Buckskin Mountains: Blanchard, 13
- Carrizo Mountain: Emery, 16
- General: Loew, 75a
- Globe quadrangle: Ransome, 04a
- Grand Canyon, Unkar terrane, pre-Cambrian: Walcott, 94
- Igneous rocks: Johannsen, 08a
- Jerome ores: Rice (M), 18
- Magmatic differentiation, Silverbell: Stewart (C A), 13
- Magnetic rocks: Hanks, 90
- Patagonia Mountains: Schrader, 15
- San Franciscan volcanic field: Robinson, 13
- Santa Rita Mountains: Schrader, 15
- Sulphide-bearing monzonite: Schrader, 15b
- Tucson Mountains, Pima Co.: Guild, 05
- Tuffs: Julien, 81a
- Tumamoc Hills: Tolman, 09
- United States-Mexico boundary: Lord, 99

*Physical geology.*

- Bisbee quadrangle: Ransome, 04, 04b
- Caliche, southern Ariz.: Blake (W P), 01b
- Canyons of the Colorado: Powell, 95a
- Cavern, Copper Queen mine, Bisbee: Beasley, 16; Hovey, 11b
- Shattuck mine, Bisbee: Wilson (P D), 14
- Clifton quadrangle: Lindgren, 05
- Colorado canyon, example of erosion: Davis (W M), 06c
- Conglomerate dikes, southern Ariz.: Campbell (M R), 04c; Stewart (C A), 11
- Detrital slopes: Blake, 07
- Earthquake, 1912: Tolman, 12c
- Erosion and deposition in bolson region: Tolman, 09a
- Fractured boulders in conglomerate: Campbell (M R), 06a
- Globe quadrangle: Ransome, 04a, 08b
- Grand Canyon: Darton, 17b
  - angular amphitheaters: Keyes, 13h
  - faulting in: Walcott, 90a
  - formation: Drygalski, 15
- Laccolitic mountain groups: Cross, 94b
- Markings on sandstones, Glen Canyon: Talmage, 00b
- Metamorphism in silicious sandstone: Merrill (G P), 07c
- Peculiarly marked sedimentary rock: Talmage, 95a
- Rhythmic banding of manganese dioxide in rhyolite tuff: Tarr (W A), 18a
- Santa Catalina gneiss, structure of: Blake (W P), 08b
- Silica and lime deposition: Darton, 12b
- Volcano, recent, in San Francisco Mountain region: Johnson (D W), 07b

## Arizona—Continued.

*Physiographic geology.*

- Bajadas, Santa Catalina Mountains: Tolman, 15a; Tucson bolson: Visser, 13
- Bolson region: Tolman, 09b
- Canyon Diablo: Sjögren, 11
- Clifton quadrangle: Lindgren, 05
- Colorado Canyon district: Davis (W M), 00b, 02e, 05f, 09a, b; Hallock, 10
- Colorado River: Powell, 75
- Coon Butte: Barringer, 06, 06a; Darton, 10a, 16b; Davison (J M), 10; Fairchild, 07d, e; Foote (A E), 91a; Gilbert, 96; Guild, 07a; Keyes, 10, 10d, h, 11 h; Merrill (G P), 09a; Pickering, 09a; Tilghman, 06
- Crater Mountain (Coon Butte): Foote (A E), 91a (*see also* Meteor Crater *below*)
- Erosion cycle in Grand Canyon district: Robinson (H H), 10
- Explosion craters: Darton, 16b
- Fort Apache region: Reagan, 03b
- General: Gilbert, 75, 75a; Howell (E E), 75; Huntington, 14; Johnson (D W), 06b; Marvin, 75; Pumpelly, 63; Ransome, 16
- Glacial deposits, so-called, Navajo Reservation: Gregory (H E), 15b
- Glacial moraines, supposed: Silliman (jr), 64, 64c
- Glaciation: Stone (G H), 01a; evidences of: Merrill (F J H), 06a; San Francisco Mountain: Atwood, 05; Johnson (D W), 10a
- Grand Canyon region: Cadell, 87; Darton, 17b; Davis (W M), 01, 01b, 09a, 13c; Dutton, 81, 82, 82a; Emmons (S F), 93; Harker, 92; Johnson (D W), 09, 12a; Margerie, 84; Noble, 11, 14, 18; Powell, 72, 73a, 75; Robinson (H H), 11; Toulia, 87; Walcott, 90a, 95a
  - angular amphitheaters: Keyes, 13h
  - evolution: Hewitt, 89; Tertiary history: Dutton, 82a
- Lake Quiburis, Pliocenelake: Blake (W P), 02c
- Little Colorado Valley: Gregory (H E), 14; Ward, 01
- Meteor Crater: Barringer, 10, 15; Foote (A E) 92b; Hastings, 09; Magie, 10; Margerie, 13; Meinecke, 09; Merrill (G P), 08, 09a, 10a; Niermeyer, 13; Thomson (E), 12 (*see also* Coon Butte and Crater Mountain *above*)
- Montezuma's Well, origin: Blake (W P), 06
- Natural bridge: Gardiner, 85
- Navajo country: Gregory (H E), 15d, 16a, 17
- Northern Ariz.: Davis (W M), 03; Powell, 95
- Painted Desert: Carter (O C S), 04
- Peneplain, Grand Canyon district: Johnson (D W), 07e; Tertiary, plateau district: Robinson (H H), 07
- Plateau region: Griswold, 95c
- San Francisco volcanic field: Robinson (H H), 13
- San Francisco Mountain region: Atwood, 05; Johnson (D W), 07b
- Southern Ariz.: Fairbanks, 03
- Sulphur Spring Valley: Meinzer, 13
- Tertiary plateau district: Robinson (H H), 07
- Tuba oasis: Gregory (H E), 15c



## Arizona—Continued.

*Underground water.*

- General: Skinner, 03  
 Gila Valley: Lee (W T), 04  
 Navajo country: Gregory (H E), 16a  
 Northern Ariz.: Darton, 10a  
 Paradise Valley: Meinzer, 15a  
 Salt River valley: Lee (W T), 05  
 San Simon Valley: Schwennesen, 17  
 Sulphur Spring Valley: Meinzer, 13  
 Tuba oasis: Gregory (H E), 15c  
 Western Ariz.: Lee (W T), 08a

## Arkansas.

- Arkansas River: Warder, 54  
 Arkansas Valley: Abert (S T), 70  
 Bibliography: Branner, 94, 09; northern Ark.: Branner, 00  
 Crowley's Ridge: Branner, 91a  
 General: Marcou, 55; Nuttall, 21; Owen (D D), 58a  
 Ozark uplift: Hopkins (T C), 94  
 Red River raft region: Collins (H C), 73  
 Report of State geologist: Branner, 87b, 88  
 Sebastian Co.: Gannaway, 84  
 Soil geology: Loughridge, 84a  
 Surveys: Branner, 94a

*Economic geology.*

- Anthracite: Griffith, 06  
 Antimony: Hess, 08c; Shriver, 17; Wait, 80; Williams (C P), 75; Sevier Co.: Dunnington, 78  
 Asphalt, Pike Co.: Hayes, 02c, 03i; southwestern Ark.: Miser, 18a  
 Bauxite: Berger, 04; Branner, 91b, 97; Fermor, 16; Hayes, 01a; Mead, 15; Parker (E W), 00; Wysor, 16  
 Benton Co.: Simonds, 94  
 Cement materials: Eckel, 13; Branner, 88a; Fitzhugh, 05; Taff, 02b; southwestern Ark.: Branner, 98a  
 Chalk: Taff, 02b  
 Chemical report: Elderhorst, 58, 60; Peter (R), 60  
 Clays: Branner, 08  
   Dallas Co.: Siebenthal, 94  
   Garland Co.: Eckel, 06e  
 Coal: Branner, 93a; Collier, 07a, b; Crane, 05a; Griffith, 06; Howard, 55; Lawrence, 51; Scholz, 05; Steel, 10a; Taff, 02a; Winslow, 88  
   Camden field: Taff, 00a  
   Fort Smith: Shumard (G G), 58  
   Johnson Co.: Potter, 75  
   Sebastian Co.: Hackett, 14; Shaw (A H), 12; Bonanza: Bain, 98g  
   western Ark.: Bache, 03  
 Crowley's Ridge: Call, 91  
 Dallas Co.: Siebenthal, 94  
 Diamonds, Pike Co.: Arkansas Diamond Company, 08; Eberle, 09; Fuller (J T), 08; Glenn, 12c; Kunz, 07c, 08a; McCourt, 10; Miser, 14; Schneider, 07, 08b; Washington, 08b  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 Fayetteville quadrangle: Adams (G I), 05  
 Fort Smith-Poteau gas field: Smith (C D), 14

## Arkansas—Continued.

*Economic geology—Continued.*

- Fuller's earth: Branner, 12; Miser, 13  
 General: Ashley, 97; Haddock, 73; Lawrence (B), 52; Padon, 51  
 Glass-sand deposits: Burchard, 06a, 07d  
 Gravel, Caddo Gap and De Queen quadrangles: Miser, 18  
 Iron: Penrose, 92, 92a  
 Joplin district: Boyd (W W), 12  
 Lead: Wittich (L L), 10a  
   northern Ark.: Adams (G I), 03c, 04; Branner, 00, 02b  
   Ozark region: Bain, 01  
   Pulaski Co.: Smith (J L), 67a  
 Lignite: Britton (J B), 73  
 Limestone: Hopkins (T C), 93  
 Manganese: Harder, 10; Penrose, 91  
   Caddo Gap and De Queen quadrangles: Miser, 17  
   northern Ark.: Penrose, 91b  
 Marble: Hopkins (T C), 93  
 Middle and southern cos.: Owen (D D), 60  
 Mineral resources: Estes, 09; Purdue, 12  
 Mineral waters: Branner, 92  
 Murfreesboro eruptives magnetic: Harris, 09a  
 Northern Ark.: Adams (G I), 04; Cox (E T), 58; Owen (D D), 58  
 Novaculite, Hot Springs: Wait, 74; Griswold, 91, 92; origin: Griswold, 95  
 Ozark region: Haworth, 00; Schoolcraft, 53  
 Phosphate: Branner, 97c, 02a; Purdue, 07a, d; Waggaman, 12  
 Semi-anthracite field, Sebastian Co.: Shaw (A H), 12  
 Silver: Conrad (C P), 80  
 Slate: Dale, 04, 06c; Purdue, 09, 10; Little Rock: Warder, 53  
 Southwestern Ark.: Hill (R T), 88; Roberts, 88  
 Washington Co.: Simonds, 91  
 Western Ark.: Stevens (W B), 00; mineral deposits: Allen (W C B), 10  
 Western central Ark.: Comstock, 88  
 Whetstones and novaculites: Griswold, 92  
 White River and tributaries: Gladson 11  
 Winslow quadrangle: Purdue, 07b  
 Zinc: Hedburg, 02; Wittich (L L), 10a  
   Boone and Marion cos.: Thomas (K) 13  
   Marion Co.: Anon, 89a  
   Northern Ark.: Adams (G I), 03c, 04; Branner, 00, 02b  
   occurrence: Purdue, 06  
   Ozark region: Bain, 01  
   Rush Creek district: Chance, 90  
   Sevier Co.: Phillips (W B), 01b
- Historical geology.*  
 Arkansan series: Keyes, 01n  
 Arkansas River: Warder, 54  
 Batesville district: Girty, 15b; Penrose, 91  
 Batesville sandstone, northern Ark.: Girty, 15a; Weller, 97  
 Benton Co.: Simonds, 94  
 Bingen sand: Berry, 17a  
 Boone limestone, St. Joe: Girty, 15c  
 Borings: Wilson (E H), 82  
 Caddo Gap and De Queen quadrangles: Miser, 17, 18



## Arkansas—Continued.

*Historical geology—Continued.*

- Camden coal field: Taff, 00a  
 Carboniferous: Lesquereux, 63; Williams (H S), 95a  
 Coal Measures: Keyes, 98a; Smith (J P), 94, 96  
 Coal regions: Collier, 07b; Winslow, 88  
 Comanche series: Hill (R T), 91  
 Cretaceous: Hill (R T), 89d, e  
 Crowley's Ridge: Call, 90, 91; Salisbury, 91a  
 Crystalline rocks, age: Branner, 89a  
 Dallas Co.: Siebenthal, 94  
 Devonian interval: Williams (H S), 99a  
 Eastern Ark.: Call, 90a, 91a  
 Eocene: Berry, 16a  
 Eureka shale, northern Ark.: Hopkins (T C), 92  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 Fayetteville quadrangle: Adams (G I), 05  
 Fayetteville-Huntsville section: Harris, 91  
 Fort Smith-Poteau gas field: Smith (C D), 14  
 Fourche Cove: Powell (W B), 42  
 Graptolite shales, age: Gurley (R R), 92  
 General: Blake (W P), 56a; Branner, 08; Cox (E T), 60; Featherstonhaugh, 35a; Haddock, 73; Hopkins (T C), 93; Marcou, 56  
 Hot Springs district: Weed, 02  
 Igneous rocks: Williams (J F), 91  
 Lignitic stage: Harris, 97  
 Little Rock region: Engelmann, 51  
 Loess, Crowley's Ridge: Shimek, 16  
 Magnet Cove region: Williams (J F), 91  
 Manganese beds, Batesville district: Williams (H S), 94b  
 Mesozoic: Marcou, 89g; northern limit: Hay (O P), 88  
 Middle and southern cos.: Owen (D D), 60  
 Midway stage: Harris, 96  
 Mississippian: Keyes, 95n  
 Morrow group: Mather, 15  
 Neozoic: Hill (R T), 92f  
 Northeastern Ark: Stephenson, 16a  
 Northern Ark.: Adams (G I), 04; Branner, 00; Cox (E T), 58; Owen (D D), 58; Purdue, 05; Ulrich, 04  
 Northwestern Ark.: Schmitz, 99  
 Novaculite area: Griswold, 91, 92  
   age of rocks: Prosser, 92  
 Ouachita Ordovician area: Purdue, 09a  
 Ozark region: Adams (G I), 01; Featherstonhaugh, 35a; Hershey, 99c; Keyes, 95k; Carboniferous: Keyes, 98m  
 Paleozoic: Ashley, 97; Branner, 96a; Williams (H S), 00a  
 Plant localities, Ouachita uplift: Prosser, 92a  
 Pottsville formations: Mather, 17  
 Red River region: Hill (R T), 94  
 St. Francis Co.: Call, 91  
 Silurian, Batesville: Van Ingen, 01  
 Southern Ark.: Veatch, 05, 05a, 06e  
 Southwestern Ark.: Branner, 98a; Hill (R T), 88  
 Tertiary: Heilprin, 84a  
   northeastern Ark.: Call, 94  
   southern Ark.: Harris, 94  
 Trinity formation: Hill (R T), 88a  
 Washington Co.: Branner, 91; Simonds, 91

## Arkansas—Continued.

*Historical geology—Continued.*

Western central Ark.: Comstock, 88

Winslow quadrangle: Purdue, 07b

*Mineralogy.*

- Anatase, Magnet Cove: Penfield, 94g  
 Antimony ochre, Sevier Co.: Santos, 77  
 Arkansite: Teschemacher, 49; altered to rutile: Rath, 76  
 Arkansite, ozarkite, and schorlomite: Whitney, 49c  
 Brookite, Magnet Cove: Dana (E S), 86d; Penfield, 86; Rath, 76a  
 Catalogue of minerals: Harvey (F L), 86  
 Diamond: Kunz, 07c, d  
 Dysanalyte, Magnet Cove: Mar, 90  
 Eleonorite, Sevier Co.: Koenig, 88, 89c  
 Eudialyte and eucolite, Magnet Cove: Williams (J F), 90  
 Hydrotitanite, Magnet Cove: Koenig, 76d  
 Joe Wright Mountain, Batesville, Independence Co.: Cohen, 91  
 Manganopectolite, Magnet Cove: Williams (J F), 90a  
 Magnetite, Magnet Cove: Koenig, 78b  
 Meteorite, Cabin Creek, Johnson Co.: Kunz, 87c, i; Whitfield (J E), 87  
   Independence Co.: Hidden, 86, 86e  
   Lamar, Johnson Co.: Kunz, 87  
   Newton Co.: Smith (J L), 65  
 Minerals, new: Shepard, 46  
 Newtonite, Newton Co.: Brackett, 00  
 Protovermiculite, Magnet Cove: Koenig, 77c  
 Pseudomorph, Magnet Cove: Kunz, 86l  
 Rectorite, Garland Co.: Brackett, 00  
 Rutile, Magnet Cove: Rath, 77, 77b  
 Rutile after brookite: Rath, 77  
 Schorlomite, Magnet Cove: Koenig, 87a  
 Sevier Co., antimony deposits: Dunnington, 78  
 Southern Ark.: Veatch, 06e  
 Variscite: Bertrand, 82; Chester (A H), 77; Lacroix, 86

*Paleontology.*

- Anthracoartus, Washington Co.: Harvey (F L), 86a  
 Batesville sandstone fauna: Girty, 15a; Weller, 97  
 Boone chert fauna, Batesville: Girty, 15b  
 Boone limestone fauna, St. Joe: Girty, 15c  
 Brimosaurus: Leidy, 54a  
 Carboniferous: Shumard (B F), 53; Williams (H S), 95a  
   coal fields: Girty, 07  
   Fayetteville shales: Girty, 10a  
 Coal Measures marine: Smith (J P), 96  
 Conard fissure, a Pleistocene bone deposit: Brown (B), 08  
 Cretaceous: White (C A), 81e, 82a  
 Enclimatoceras: White (C A), 84a  
 Eocene: Berry, 16a  
 Graptolites: Gurley (R R), 92a  
 Griffithides, Coal Measures: Vogdes, 95a  
 Loess, Crowley's Ridge: Shimek, 16  
 Moorefield shale: Girty, 11  
 Morrow group fauna: Mather, 15  
 Paleohillia, Cretaceous: Knowlton, 95a  
 Paleozoic: McChesney, 67; Williams (H S), 00a



## Arkansas—Continued.

*Paleontology*—Continued.

- Plantae: Lesquereux, 60; Bingen sand: Berry, 17a; coal fields: White (D), 07b  
 Pleistocene, northern Ark.: Brown (B), 05a  
 Silicified woods: Call, 91a  
 Silurian, Batesville: Van Ingen, 01  
 Trigonocarpum: Moss, 50  
 Woods and lignites: Knowlton, 91

*Petrology.*

- Catalog of rocks: Harvey (F L), 86  
 Dikes, basic: Kemp, 91; tabulation: Kemp, 91a  
 Foyaite-ijolite series, Magnet Cove: Washington, 01  
 Igneous rocks: Williams (J F), 91  
 Magnet Cove, igneous complex: Washington, 00, 01b  
 Novaculite: Derby, 98; origin: Rutley, 94  
 Peridotite, Pike Co.: Branner, 89; Purdue, 08

*Physical geology.*

- Breccias, origin, northern Ark.: Adams (G I), 03d  
 Cave-sandstone deposits: Purdue, 07  
 Erosion, Arkansas River: Branner, 93  
 Fracture systems: Hobbs, 05  
 New Madrid: Fuller, 05t  
 Overthrust fault and anticline, Ozark: Purdue, 01a  
 Rock folds due to weathering: Campbell (M R), 06c  
 Sulphur Springs deposits: Siebenthal, 14  
 Western Ark.: Winslow, 91b

*Physiographic geology.*

- Alluvial cone topography: Purdue, 04a  
 Arkansas Valley: Adams (G I), 00; Keyes, 01b  
 Benton Co.: Simonds, 94  
 Boone region: Purdue, 03  
 Boston Mountains: Hershey, 02c; Purdue, 01b  
 Camp Pike, Little Rock quadrangle: Stephenson, 18c  
 Crowley's Ridge: Call, 91; Marbut, 95  
 Drainage: Newsom, 97  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 Fayetteville quadrangle: Adams (G I), 05  
 Fourche Cove, Pulaski Co.: Lesley (J), 60  
 General: Loughridge, 84a  
 Marble belt: Hopkins (T C), 91  
 Northeastern Ark.: Call, 94; Shaw (E W), 18e; Stephenson, 16a  
 Ouachita uplift: Griswold, 92a  
 Peneplains, Ozark highland: Hershey, 01  
 Red River and Clinton monoclines: Newsom, 97  
 Southern Ark.: Davis (W M), 07  
 Valleys of solution: Purdue, 01  
 Western Ark.: Winslow, 91b

*Underground water.*

- General: Purdue, 04  
 Hot Springs: Branner, 92; Purdue, 10a, 11; Weed, 02, 05f  
 Mineral waters: Branner, 92  
 Northeastern Ark.: Stephenson, 16a  
 Northern Ark.: Purdue, 05, 05b  
 Ozark region: Adams (G I), 05a; Fuller, 05p  
 Southern Ark.: Veatch, 05, 05a  
 Sulphur Springs: Siebenthal, 14  
 Winslow quadrangle: Purdue, 05a

Arkansas River, reconnaissance: Warder, 54

Arkansas Valley: Darton, 06f; Keyes, 01b

Arkose deposits: Barton, 16; formation: McGee, 96e

Arroyos, formation of: Dodge (R E), 02a, 10

Arsenic: U S G S, 83

Canada: McLeish, 10, 14

New York, Putnam Co.: Judd, 08

Ontario, Cobalt: Rickard (T A), 07a

Virginia, Brinton: Cowan, 04; Hess, 11

Arsenopyrite, Virginia: Watson, 07e

Artesian waters and wells. *See* Underground water.

Arthrodiros: Dean, 07; Eastman, 06; Hussakof, 06; Kentucky, Devonian: Hussakof, 13; Ohio: Hussakof, 11

Arthrognathi, relationships: Dean, 01b

Arthropycus: James (J F), 93a; Sarle, 06

Arthropycus and Daedalus, burrow origin: Sarle, 05

Air-breathing animals, Paleozoic, of Canada: Dawson (J W), 95a

Arthropoda. *See also* Arachnida; Cirripedia; Crustacea; Insecta; Invertebrata; Myriapoda; Ostracoda; Trilobita.

Ballostoma, Florissant, Colo.: Scudder, 85e

Classification: Kingsley, 94

Derivation and homologies: Dana (J D), 94

Earliest freshwater arthropods: Schuchert, 16d

Estheriae, North and South Carolina: Jones (T R), 63

Habitat and origin: Schuchert, 16d

Illinois, Carboniferous: Fritsch, 07; Meek, 68, 68a; Melander, 03; Packard (A S), 89; Scudder, 68

Index fossils: Grabau, 09f

Nova Scotia, Carboniferous: Scudder, 82c

Paleozoic arachnids, scorpions, and spiders: Petrunkevitch, 13a

Phyllocarida: Packard (A S), 82a

Planocephalus, Florissant: Bertkau, 85; Canu, 86

Relation to the strand line: Clarke (J M), 11d

Tertiary, Florissant, Colo.: Cockerell, 07d

Texas, Scalpallum and Balanus: Pilsbry, 97b

Xiphosura, Carboniferous: Packard (A S), 87

Articulata. *See* Arthropoda.

Artiodactyla: Cope, 88q; bunodont: Sinclair, 14

Artionyx: Osborn, 93a

Aruba.

General: Martin (K), 88

*Paleontology.*

Corals: Vaughan, 01

Mollusca: Lorie, 89

*Petrology.*

General: Kloos, 89

Asaphidæ, parallelism: Raymond (P E), 12a

Asbestos.

Arizona: Pratt, 05a

British Columbia, Similkameen district: Cammell, 11; Trout Lake district: Emmens, 10d

California: Aubury, 06

Canada: Mollman, 02; McLeish, 10, 14; Pearson, 12; Young (G A), 09

Depth of deposits: Cirkel, 09c



## Asbestos—Continued.

- General: Cirkel, 05a; Diller, 07b, 11, 18; Ells, 91a; Joseph, 15b; Merrill (G P), 95d, 96; Pratt, 01i; Schaaf-Regelmann, 07a; Smith (G O), 06c; U S G S, 83
- Genesis: Taber, 16a
- Georgia: McCallie, 10
- Ontario, Gowganda district: Collins (W H) 09; Montreal River district: Collins (W H), 09c
- Nephrite in asbestos veins: Woolsey, 13
- Newfoundland, Port au Port: Willis, 94
- Origin: Barlow, 10; Dresser, 10c; of chrysotile veins: Taber, 17a
- Oregon: Stafford, 04
- Quebec: Barlow, 63; Cirkel, 09c, 10, 10a; Dresser, 09b, c; Harvie, 13; Stokes (R), 07c; Woolsey, 10
- Amherst: Cirkel, 11a
- Black Lake-Thetford area: Graham, 17
- Chibougamau region: Barlow, 11, 11a; Duli-eux, 10; Low, 06a
- eastern Que.: Dresser, 09b, 10d
- Thetford: Rider, 10
- Thetford-Black Lake district (Coleraine sheet): Knox, 17
- South Carolina: Sloan, 08
- Types and modes of occurrence: Diller, 11
- Veins of asbestiform minerals, origin: Taber, 16
- Vermont: Richardson (C H), 10, 11
- Virginia: Watson, 07e
- Wyoming: Beeler, 08, 10; Jamison, 11
- central: Barrow, 10
- Casper Mountain: Beeler, 11
- Ascutney Mountain, Vt.: Daly, 03
- Ashburner, C. A., biography: Lesley, 90, 90a, b; Winslow, 90b
- Ashcroft, B. C.: Evans (H F), 05b
- Asheville folio, N. C.-Tenn. (no. 116): Keith, 04
- Aspen, Colo.: Loughlin, 09
- Asphalt. *See also* Bitumens; Bituminous rocks and sands; Grahamite.
- Arkansas, Pike Co.: Hayes, 02c
- southwestern: Miser, 18a
- Aspen district, Colorado: Newberry, 90; Spurr, 98
- Barbados: Ells, 11; manjak: Merrivak, 98
- California: Hilgard, 85
- Colorado, Middle Park: Lee (H A), 99
- Formation of veins: Eldridge, 06
- General: Broadhead, 77; Hovey, 04n; Newberry, 72a; Richardson (C), 15; Sadtler, 95; Taff, 07b; U S G S, 83
- Kentucky, Edmonson and Grayson cos.: Bryant (J O), 14
- Meade and Breckenridge cos.: Foerste, 10a
- Michigan, Delta Co.: Lane, 02l
- Nevada, northeastern: Anderson (R), 09
- Oklahoma: Gould, 08d, e, 09, 10c; Snider, 13b, 13c; Taff, 09a
- Arbuckle Mountains: Reeds, 10
- southern: Hutchison, 11
- Oregon: Stafford, 04
- Origin: Bryant (J O), 14; Peckham, 69; Richardson (C), 16, 17; California: Cooper (A S), 93, 99

## Asphalt—Continued.

- Origin and distribution: Eldridge, 03
- Trinidad: Cadman, 08; Ells, 07, 07a, 11; San Fernando field: Cunningham-Craig, 05c
- United States: Eldridge, 01, 01a; Shaw, 17a
- Utah: Ritter, 13
- West Virginia, Pleasants, Wood, and Ritchie cos.: Grimsley, 10
- Wyoming: Jamison, 11
- Aspideretes, Belly River formation, Alta.: Lambe, 14a
- Assiniboia.
- Paleontology.*
- Horses, fossil: Lambe, 06e
- Hyracodon: Lambe, 06d
- Testudo and Baena: Lambe, 06b
- Associations, meetings.
- American Association for the Advancement of Science. Boston meeting, 1847: Anon, 47
- Ann Arbor, 1885: Anon, 85b
- Atlanta meeting, 1913-4: Kay, 14a
- Baltimore meeting, 1908: Gulliver, 09a
- Boston, 1898: Hovey, 98; Upham, 98a
- Boston-Cambridge meeting, 1909: Gulliver, 10
- Buffalo, 1886: Davis (W M), 86; Anon, 86
- Buffalo, August 1896: Rice (W N), 96a; Upham, 96o
- Chicago meeting, 1907: Bayley, 08a
- Cleveland, 1912-3: Kay, 13
- Columbus, 1899: Hollick, 99d
- Columbus, December, 1915: Kay (G F), 16
- Denver 1901: Hovey, 01a, b; Patton, 01
- Detroit, 1897: Smyth (C H), 97c
- Hanover meeting, 1908: Willis, 08a
- Ithaca, N. Y., 1906: Hovey, 06b
- Minneapolis, 1883: Anon, 83b
- Minneapolis, 1910: Grout, 11a
- New Orleans, 1905: Hovey, 06a
- New York, 1887: Anon, 87
- New York City, 1900: Holmes (J A), 00a; Hovey, 00a
- New York City, 1906: Hovey, 07
- Philadelphia, 1884: Anon, 84d
- Philadelphia, December, 1904: Hovey, 05c,
- Pittsburgh meeting, 1917: Salisbury, 18a
- Plattsburg, N. Y., 1907: Gulliver, 07
- Syracuse, 1905: Hovey, 05d
- Washington meeting, 1903: Hovey, 03b
- American Geological Society: Anon, 20
- American Paleontological Society, Philadelphia, 1904: Hay (O P), 05f; section A: Hay (O P), 05d
- American Society of Vertebrate Paleontologists, seventh annual meeting: Matthew (W D), 09d
- American Society of Vertebrate Paleontology: Loomis, 08
- Association of American Geologists Clarke (J M), 03h
- Albany, 1843: Silliman (jr), 43
- Boston, 1842: Anon, 42, 43
- New Haven, 1845: Anon, 45, 45b
- Philadelphia, 1840: Anon, 40
- Philadelphia, 1841: Anon, 41
- Washington, 1844: Anon, 44



## Associations, meetings—Continued.

- Association of American State Geologists, field meetings: Cleland, 16b
- British Association, Montreal, 1884: Anon, 84c
- Winnipeg: Knight (C W), 09
- Geological societies in United States: Winchell (N H), 14a
- Geological Society of America, history, organization, etc.: Am G, 89a, 90a; Fairchild, 14; Hitchcock, 10a; McGee, 89a; Stevenson, 90, 14; Winchell (A), 90; Winchell (N H), 14
- Albany, December 1900: Ami, 02h; Fairchild, 01; Hovey, 01; Kemp, 01a
- Albany, December, 1916: Berkey, 17
- Albuquerque: Hovey, 08a, 09b; Knight (C W), 08
- Baltimore, 1894: Fairchild, 95; Kemp, 95d
- Baltimore, 1908: Hovey, 09c, 10a
- Boston, 1893: Fairchild, 94; Hovey, 94c
- Boston, 1898: Fairchild, 99
- Boston-Cambridge, 1909: Hovey, 10c, d, f
- Brooklyn, 1894: Fairchild, 94a
- Buffalo, 1896: Fairchild, 96a; Upham, 96o
- California, August, 1915: Hovey, 15b; Taff, 15
- Columbus, 1891: Fairchild, 92a
- Columbus, 1899: Fairchild, 00a
- Denver, 1901: Fairchild, 01a
- Detroit, 1897: Fairchild, 97a; Smyth (C H), 97d
- Indianapolis, 1890: Stevenson, 91
- Madison, 1893: Fairchild, 93b
- Montreal, 1897: Fairchild, 98; Kemp, 98c
- New Haven, 1912: Hovey, 13, 13a
- New York, 1889: Stevenson, 90a; Winchell (A), 90b; Anon, 90d
- New York, 1898: Ami, 99c; Fairchild, 00; Hovey, 99; Kemp, 99d
- New York, 1900: Fairchild, 00c
- New York, 1906: Hovey, 07c, 08
- Ottawa, 1892: Fairchild, 93a; Anon, 93
- Ottawa, 1905: Fairchild, 07h
- Philadelphia, 1895: Fairchild, 96; Kemp, 96b; Upham, 96h
- Philadelphia, 1904: Fairchild, 06b; Hovey 05, 05a, b
- Philadelphia, 1914: Hovey, 15, 15a
- Pittsburgh, 1902: Fairchild, 03a; Gulliver, 02
- Pittsburgh, 1910: Hovey, 11, 11a
- Princeton, 1913: Hovey, 14
- Rochester, 1892: Fairchild, 92b
- Rochester, 1901-2: Fairchild, 03; Grabau, 02c; Hovey, 02
- Saint Louis, 1903-4: Fairchild, 04a; Hovey, 04
- St. Louis, 1917: Hovey, 18
- Springfield, 1895: Fairchild, 95a; Kemp, 95e
- Toronto, 1889: Stevenson, 90
- Washington, 1890: Stevenson, 91a
- Washington, 1891: Fairchild, 92
- Washington, 1896: Fairchild, 97; Kemp, 97d
- Washington, 1899: Fairchild, 00b; Hovey, 00; Kemp, 00a
- Washington, 1902-03: Fairchild, 04; Hovey, 03, 03a; Kemp, 03b
- Washington, 1912: Hovey, 12, 12a
- Washington, 1915: Berkey, 16

## Associations, meetings—Continued.

- Geological Society of America, proceedings
- Cordilleran section 1899: Fairchild 00b; Lawson, 00
- 1900: Fairchild, 01
- third annual meeting: Fairchild, 03; Lawson, 02b
- fourth meeting: Fairchild, 04
- fifth meeting: Fairchild, 04a
- sixth meeting: Fairchild, 06b
- seventh meeting: Fairchild, 07h
- eighth meeting: Hovey, 08
- tenth meeting: Louderback, 10, 10a
- twelfth meeting: Louderback, 12a
- thirteenth meeting, 1912: Louderback, 13a
- meeting 1913: Louderback, 14
- meeting, 1914: Louderback, 15
- Geological Society of American Universities: Arnold, 03a
- Geologists of northeastern United States: Berkey, 08a; second annual spring conference: Wherry, 09a
- International Congress of Geologist: Gilbert 87
- International Geological Congress: Cook (G H) 88a
- American committee: Am G, 88; Dana, 88a; Frazer, 87a, 88, 89; Powell, 88d; Williams (H S), 90c
- Berlin: Frazer, 85, 86b, c; Anon, 85c
- Eighth, Paris: Aguilera, 03; Frazer, 01b, 02; Hague, 01a
- Eleventh: Kemp, 11b
- Fourth, London meeting: Anon, 88b
- origin, etc.: Frazer, 88b
- proceedings: Int G Cong, 78
- St Petersburg: Ballou, 97a
- Second: Marcou (J B), 83
- Stockholm: Hobbs, 10e
- Tenth: Int G Cong, 06; Offret, 07
- Twelfth: Hobson, 13; Penrose, 13; Anon, 13a
- Washington meeting: Am G, 91a
- work of: Gilbert, 87
- 1891: Martin (D S), 91
- International Zoological Congress, Seventh, Section of Paleozoology: Grabau, 07b
- Meeting of geologists with New York Academy of Sciences: Berkey, 08a
- New England intercollegiate geological excursion: Brown (R M), 09; Cleland, 10a; 14th: Barrell, 16b
- Paleontologic record, conference papers: Clarke (J M), 10a
- Paleontological Society, second annual meeting: Bassler, 11c
- third annual meeting: Bassler, 12
- fourth meeting, 1912: Bassler, 13
- fifth meeting, Princeton, 1913-4: Bassler, 14, 14a
- Philadelphia, 1914: Bassler, 15
- California meeting, 1915: Stock, 15
- seventh meeting, Washington, 1915: Bassler, 16
- eighth meeting, December, 1916: Bassler, 17
- Pittsburgh meeting, 1917-8: Bassler, 18
- Paleontological Society, Pacific Coast section, third meeting, 1912: Dickerson, 13a
- fourth meeting: Dickerson, 14e



## Associations, meetings—Continued.

- Paleontological Society, Pacific Coast section,  
fifth annual meeting: Waring (C A), 15
- sixth meeting: Packard (E L), 16b
- seventh meeting: Stock, 17c
- eighth meeting: Stock, 18a
- Society of Vertebrate Paleontologists, Philadel-  
phia, 1903: Hay (O P), 04b
- World's congress, 1893: Ami, 93b

## Asteroidea.

- Asterias antiqua*, Tennessee: Troost, 35b
- Astropecten montanus*, Fort Benton beds:  
Douglass, 03
- Brittle star, Miocene, Santa Cruz Mountains,  
Cal.: Arnold, 08e
- Canada: Grant (C C), 91; Ordovician: Billings,  
58b
- Carboniferous, Montana: Raymond (P E), 12b
- Cincinnatian: Meek, 72c; Miller (S A), 84
- Classification and catalog of Paleozoic starfish:  
Schuchert, 14
- Feeding habits: Clarke (J M), 12b
- General: Hall, 67d
- Helianthaster*: Clarke (J M), 08
- Illinois, Carboniferous: Worthen, 83c
- Maine, Lewiston, starfish, post-Pliocene: Baker  
(W W), 58
- New York, Devonian: Clarke (J M), 12
- Ohio, Adams Co., starfish: Williams (S R), 14
- Cincinnati, starfish: Graham, 46
- Onychaster*, Crawfordsville, Indiana: Sollas, 13  
structure: Schöndorf, 09
- Ordovician, Ontario: Raymond (P E), 12b
- Paleaster*: Hall, 67d
- Cincinnati: Locke, 46
- Cincinnatian: Miller (S A), 80d
- Nova Scotia: Billings, 60c
- Paleaster eucharis*: Cole (A H), 92
- Palasterina(?) jamesii*: Dana, 63b
- Pentagonaster*, Cretaceous, Wyoming: Weller,  
05c
- Protaster*: Parks, 08a, 09
- Protopalæaster narrawayi*: Hudson (G H),  
12a, 13a; Raymond (P E), 12c
- Scutellaster*, Colorado: Cragin, 95
- Starfish with ambulacral covering plates:  
Hudson, 12a
- Stelleroidea, Paleozoic: Schuchert, 15
- Stereograms: Hudson (G H), 13
- Urasterella*, New York: Hudson, 16
- Asthenosphere: Barrell, 14a
- Astrophyllite in granite of Quincy, Mass.: Pirsson,  
10
- Atik-Okan nickeliferous deposits: Hille, 06
- Atikokania: Rothpletz, 15
- Atlanta district, Idaho: Clayton, 77
- Atlantic border region, lineaments: Hobbs, 04
- Atlantic coast sediments: Frazer, 76g; Lesley, 76d
- Atlantic gold district, Wyo.: Spencer (A C), 16
- Atlantic shore line, history: Harris (H L), 94
- Atlantis: Schuchert, 17, 17a
- Atlantochelys: Agassiz (L), 49
- Atlantosaurus beds: Williston, 05; age: Lee (W T),  
03a
- Atlin district, B. C.: Cairnes, 13; Gwillim, 01

## Atmosphere.

- Carbon dioxide: Hunt, 80d
- Equilibrium between carbon dioxide of atmos-  
phere and calcium compounds of water:  
Stieglitz, 09
- General: Chamberlin, 97a, 99a; Hunt, 80d
- Geologic relations: Hunt, 78c
- In geologic times: Wurtz, 70
- Origin: Fairchild, 04c
- Primeval: Hunt, 66c; McKee, 06
- Atoka folio*, Okla. (no. 79): Taff, 02
- Atolls, formation: Vaughan, 14e
- Attica quadrangle N. Y.: Luther, 14
- Aubrey limestone: Reagan, 04a
- Auburn chert fauna: Branson, 09
- Auburn quadrangle, N. Y.: Luther, 10
- Austin chalk, Tex.: Prather, 02
- Austin folio*, Tex. (no. 76): Hill (R T), 02
- Australites: Moore (E S), 16
- Autophytography: White (C H), 05
- Avalanches: Mitchell, 10
- Aves.
- Alabamornis*: Abel, 06; Lucas, 08
- Auk*, Los Angeles, Cal.: Lucas (F A), 01d
- Baptornis*: Lucas (F A), 03
- Barornis*, Eocene, New Jersey: Marsh, 94h
- California, Pleistocene, San Pedro: Miller  
(L H), 11b, 14
- Rancho La Brea asphalt beds: Gilbert (J Z),  
10; Miller (L H), 10; condor-like vultures:  
Miller (L H), 10a; eagle tarsi: Miller  
(L H), 11a
- Colorado, Florissant: Shufeldt, 17b
- Coniornis*, Cretaceous: Marsh, 93
- Cretaceous: March, 70, 72d
- Cyphornis*: Cope, 95a
- Derivation from dinosaurs: Mudge, 79b; Willis-  
ton, 79
- Development and geologic relations: Case, 98
- Diatryma*: Lucas (F A), 03
- Bighorn Basin, Wyo.: Matthew (W D), 17,  
17e,g
- New Mexico: Cope, 76a
- Egg, fossil, Arizona: Morgan, 04
- South Dakota: Farrington, 99
- Flight, beginnings: Lucas (F A), 16; Shimer,  
16a
- Florida, Vero: Shufeldt, 17, 17a, 18
- Fossil feathers: Shufeldt, 13e
- Gallinuloides*, Green River shales, Wyoming.  
Eastman, 00c; Loomis, 06a; Lucas (F A),  
00d
- Gallinuloides wyomingensis*: Shufeldt, 15b
- General: Baur, 84; Dana (J D), 63d; Leidy, 66a,  
Shufeldt, 13d
- Hargeria*: Lucas (F A), 03
- Hesperornis*: Lucas (F A), 03, 04a; Marsh, 72,  
72d, 83; Shufeldt, 97a
- affinities: Helm, 91; Marsh, 97a; Shufeldt, 90
- dermal covering: Williston, 96a
- Montana: Shufeldt, 15c
- Hesperornis* and *Baptornis*, restorations:  
Brown (B), 10a
- Hesperornis regalis*: Shufeldt, 15a
- Ichthyornis*: Marsh, 72n, 73, 83; Shufeldt, 93



## Aves—Continued.

- Jurassic: Marsh, 81g  
 Kansas, Cretaceous: Williston, 98  
 Laopteryx, Jurassic, Wyoming: Marsh, 81b  
 Mancalla, Miocene auk: Lucas (F A), 01c  
 Marsh collection: Shufeldt, 15  
 Massachusetts, Triassic: Hitchcock (C H), 66  
 Meleagridæ: Shufeldt, 13  
 New Mexico, Loup Fork marls: Cope, 75v  
 Odontornithes: Grinnell, 81; Marsh, 73b, 75c, 76e, 77a, 80  
 Oligocene fossil eggs: Troxell, 16a  
 Oregon: Shufeldt, 13c  
   avifauna at Fossil Lake: Miller (L H), 11  
   Equus beds: Shufeldt, 91, 91a, 92  
   Pleistocene avifauna: Shufeldt, 13a  
   Silver Lake region: Shufeldt, 91b, c, 92a  
 Origin: Gregory (W K), 16b, e; Hay (O P), 10b  
 Ostrich: Shufeldt, 13b  
 Owl remains, Rancho La Brea, California: Miller (L H), 16a  
 Pacific region: Miller (L H), 11e, 12  
 Palaeochenoides mioceanus: Wetmore, 17; South Carolina: Shufeldt, 16  
 Passerine, Colorado, Florissant: Allen (J A), 78  
 Pavo californicus, Rancho La Brea: Miller (L H), 09, 16  
 Pelvis: Baur, 84a  
 Plumage: Eastman, 04b  
 Relations to reptiles: Baur, 84a  
 Synopsis: Cope, 70; Marsh, 72r  
 Tennessee, cave bones: Shufeldt, 97  
 Teratornis from Rancho La Brea: Miller (L H), 09a  
 Tertiary: Marsh, 70  
 Tertiary and post-Tertiary: Marsh, 72i  
 Toothed birds: Allen (J A), 76c; Marsh, 83  
 Vertebrae: Marsh, 79c  
 Vulturid raptors, Rancho La Brea: Miller (L H), 16b  
 Wading bird, Amayzon shales: Cope, 81a  
   Rancho La Brea beds: Miller (L H), 10  
 Western States: Marsh, 71 e

Azoic system: Am G, 90; Whitney, 84; Lake Superior district: Foster, 51e

- Bacteria, Algonkian: Walcott, 15a; iron: Harder, 15  
 Bactrites, early stages: Clarke (J M), 94f  
 Baddeleyite from Montana: Rogers (A F), 12a  
 Baena: Lambe, 06b

## Baffinland.

General: Bell (R), 97c

*Historical geology.*

Laurentian limestones: Bell (R), 01a

*Physiographic geology.*

Glaciation: Barton, 96; Tarr, 97f

## Bahama Islands.

General: Agassiz (A), 94; Bryant, 59; Nelson (R J), 53; Northrop, 90; Schöpf, 88; Shattuck, 05; Vaughan, 13, 13a, 14, 14b

*Paleontology.*

Mollusca: Dall, 05

Quaternary: Dall, 05b

Bain, Francis, biography: Watson (L W), 03

Bajadas, Tucson bolson: Visher, 13

Baked clays, Wyoming: Bastin, 05

Baker district, Oregon: Grant (U S), 14

Baker lignite field, Custer Co., Mont.: Bowen (C F), 12

Balanidae, phylogeny: Ruedemann, 18a

Bald Mountain quadrangle (folio no. 141), Wyo.: Darton, 06c

Bannock overthrust, Idaho and Utah: Richards (R W), 12

Baptanodon: Gilmore, 06, 07a; Holland, 08b; Knight (W C), 03a; Marsh, 80b

Baptanodon beds: Williston, 05

Baraboo iron ore: Winchell (N H), 04d

Baraboo region of Wisconsin: Mansfield, 08

## Barbados.

Geology: Ells, 07, 07a; Guppy, 11; Harrison (J B), 08; Jukes-Browne, 91; Maycock, 21; Schomburgk, 48; Skey, 16

*Economic geology.*

General: Ells, 07, 07a; Harrison (J B), 90

Manjak: Goding, 66; Hovey, 08d; Merivale, 98; Merrivak, 98

Oilfields: Craig, 13; and bitumens: Ells, 11

Oil prospecting: Craig, 18

Petroleum: Ells, 11; Craig, 13; Hovey, 08d

*Historical geology.*

Coral rocks: Harrison (J B), 07

General: Craig, 18; Franks, 98; Harrison (J B), 90, 02; Maycock, 21; Schomburgk, 48; Spencer (J W), 02a

Geologic map: Harrison (J B), 90a

Radiolarian earth, origin: Harrison (J B), 89

Radiolarian marls, age: Gregory (J W), 89

*Paleontology.*

Archaeopneustes, echinoid: Gregory (J W), 92

Corals: Gregory (J W), 95

Cystechinus: Gregory (J W), 89

Foraminifera, Bissex Hill and Bowmanston Chapman (F), 98

General: Schomburgk, 48

Mollusca: Forbes, 48

Polycystina: Ehrenberg, 46, 73, 76; Schomburgk, 47

*Petrology.*

Corallimestones, structure: Hill (W), 91

Red clay: Harrison (J B), 95

Volcanic dust, La Soufrière: Coppock, 03

Barber coal field, Wyo.: Wegemann, 13

Baringer Hill minerals: Hess, 08e

## Barite.

Alaska, Wrangell: Burchard, 14c

Apalachian States: Watson (T L), 15

California: Aubury, 06.

Canada: Young (G A), 09

Cuba, Pinar del Rio Province: Catlett, 08

General: Pratt, 02c; U S G S, 83

Georgia: McCallie, 10

Cartersville district: Hayes, 08b; Vivian, 16

Kentucky: Fohs, 07, 13

central: Fohs, 10a

Franklin Co.: Miller (A M), 14

Georgetown quadrangle: Miller (A M), 13a

Missouri: Tarr (W A), 17a, 18; Wittich (L L), 12

St. Francois and Washington cos.: Buckley, 09

southern: Hughes, 11

Washington Co.: Steel, 10.



**Barite—Continued.**

- Montana: Rowe, 38, 38b  
 North Carolina: Judd, 07b  
 Nova Scotia, Cape Breton Island: Harrison (H H), 13  
 Five Islands: Hutchinson, 07a; Warren (C H), 11  
 Lake Ainslie and North Cheticamp: Poole, 07  
 Pennsylvania, Mercersburg-Chambersburg district: Stose, 09  
 South Carolina: Sloan, 07, 08  
 Kings Creek: Watkins, 15a  
 Southern States: Judd (E K), 07b  
 Tennessee: Ashley, 10b; Henegar, 12; Watson, 07  
 Cocke County: Judd (E K), 07b; Weller (C A), 07  
 Sweetwater district: Gordon (C H), 18  
 Virginia: Judd (E K), 07b; Watson, 07c, e
- Barium, concentration in limestone: Dickson, 02; determination of, in rocks: Langley, 08
- Barlow, A. E., biography: Adams (F D), 15b; White (J), 14
- Barnacles, Paleozoic: Clarke (J M), 96; Miocene, Gay Head, Mass.: Cushman, 04c
- Barnesboro-Patton folio, Pa. (no. 189): Campbell, 13a
- Barometer, measuring heights by: Gilbert, 82a
- Barrancas: Hobbs, 10
- Barrandoceras: Whiteaves, 06a
- Barrettia: Whitfield, 97c; Jamaica: Woodward (S P), 62
- Barrier beaches, Atlantic coast: Merrill (F J H), 90b
- Barris, W. H., biography: Preston (C H), 01
- Barytes. *See* Barite.
- Basalt, structure: Mallet, 75
- Base level erosion: Campbell (M R), 97a
- Base level of eolian erosion: Keyes, 09e
- Base leveling: Dutton, 82
- Base leveling and river spacing: Shaler, 99d
- Basilemys: Riggs, 06
- Basilosaurus: Buckley, 43; Gibbes, 47; Müller, 47; Tuomey, 47
- Basilosaurus cetoides, restoration of: Gidley, 10
- Basin oil and gas field, Wyo.: Hintze, 15
- Basin-range structure: Burling, 12; Keyes, 05a, 11f; Louderback, 04a; Powell, 76a
- Basin ranges, origin: Campbell (M R), 03e; Davis (W M), 03e, i; Gilbert, 03e; origin and structure: Spurr, 01a; structure: Spurr, 00e
- Basin region, structure: Le Conte, 89a
- Batesville sandstone and fauna: Weller, 97
- Bathmodon: Cope, 75p
- Batholiths. *See also* Intrusions.  
 New Brunswick, Bathurst district: Young, 11a  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d
- Bathyliths. *See* Intrusions.
- Bathygnathus: Leidy, 81
- Bathyopsis, Wind River Uintathere: Osborn, 13c
- Batrachia. *See* Amphibia.
- Batrachiodes the antiquor, Lockport: Silliman (jr), 51a; Kindle, 14e
- Battle Mountain district, Nev.: Bandmann, 14

Baur, George, biography: Hay (O P), 98c; Wheeler (W M), 99

**Bauxite.**

- Alabama: Judd (E K), 07a
- Aluminium hydrates: Wysor, 17
- Arkansas: Fermor, 16; Mead, 15; Wysor, 16
- California: Aubury, 06
- General: Hayes, 94d, 95d; Hunt (A E), 95; Laur, 95; McCalley, 94; Phalen, 08b, 12a; U S G S, 83
- Georgia: Judd (E K), 07a; McCallie, 10; Watson, 04  
 central: Watkins, 15b  
 Coastal Plain: Shearer, 17  
 southern: McCallie, 11a  
 Wilkinson Co.: Veatch (J O), 08a
- Occurrence and distribution: Watson, 04
- Southern States: Phalen, 14a
- Tennessee: Ashley, 10b, 11f, 12b, c  
 Elizabethtown: Watkins, 13
- Beach cusps. *See* Shore lines.
- Beach placers of the Pacific coast: Irvine, 08
- Beaches. *See also* Shore lines; Terraces.  
 Algonquin and Iroquois beaches: Goldthwait, 10a; Taylor (F B), 10d  
 Algonquin beach, altitude of: Goldthwait, 08a; deformation: Leverett, 13c  
 British Columbia, Victoria, Pleistocene: Newcombe, 14  
 Canada: Lyell, 43  
 Cincinnati group: James (J F), 85  
 General: Pearson, 08, 08a  
 Glacial lakes in Lake Michigan basin: Goldthwait, 08  
 Great Lakes region: Chalmers, 04a; Goldthwait, 11b; Spencer (J W), 90e, 91d, 95c; Taylor (F B), 95d, 98b, 08  
 Illinois, Chicago district: Alden, 02; Evanston-Waukegan region: Atwood, 08a  
 Indiana: Leverett, 15  
 Inherited features, accumulation of, in shore lines of elevation: Goldthwait, 11b  
 Labrador: Fuller, 07a  
 Lake Erie basin: Fairchild, 07  
 Lake Michigan: Andrews (E), 70; Hobbs, 11c; Leverett, 97b; Whittlesey, 51; Wright (G F), 18  
 Lake Ontario: Spencer, 83  
 Lakes Michigan and Huron: Goldthwait, 09a  
 Manitoba, southern: Upham, 90  
 Massachusetts, Cape Ann, elevated: Woodworth, 03b  
 Michigan: Lane, 08a; Leverett, 15  
 Ann Arbor quadrangle: Russell (I C), 08  
 Detroit district: Sherzer, 17  
 Mackinac Island: Taylor (F B), 92  
 Pleistocene, Saginaw Co.; Cooper (W F), 08  
 southeastern: Taylor (F B), 97h  
 Minnesota, northeastern: Upham, 94  
 Nevada, Big Smoky Valley: Meinzer, 17  
 New York: Fairchild, 16a  
 Champlain coast lines: Hudson, 09  
 Nova Scotia, Cow Bay: McIntosh, 16  
 Ohio: Leverett, 92; Newberry, 74  
 Berea, Cleveland, and Euclid sheets: Carney, 09b  
 Finger Lake bed: Hubbard (G D), 14



## Beaches—Continued.

- Ohio: Lorain Co.: Newberry, 74b  
 Oberlin quadrangle: Carney, 10a  
 Maumee Valley: Gilbert, 73  
 Vermilion quadrangle: Carney, 11  
 Ontario: Coleman, 01c  
 Algonquin and Nipissing shore lines: Goldthwait, 09b  
 Algonquin beach: Johnston (D W), 13a  
 Dundas Valley: Kennedy, 84  
 eastern: Coleman, 01b  
 Georgian Bay: Comstock (F M), 04  
 Iroquois Beach: Coleman, 04c, 13d  
 Lake Simcoe district: Johnston (W A), 10, 16a  
 Lincoln Co.: Wilkins, 91  
 Nipissing region: Taylor (F B), 94  
 Ottawa Valley: Johnston (W A), 16b; Keele, 13; Kindle, 18b  
 southwestern: Taylor (F B), 09  
 Quebec: Goldthwait, 14c  
 Covey Hill: Goldthwait, 13c; Spencer (J W), 12b  
 Montreal: Goldthwait, 13c  
 Ottawa Valley: Johnston (W A), 16b  
 St. Lawrence Valley: Chalmers, 04a, 08  
 southern: Goldthwait, 11  
 Vermont, Champlain basin: Hitchcock, 10  
 northwestern: Merwin, 08  
 Water-planes, ancient, and crustal deformation: Robinson (H H), 08  
 Wisconsin, eastern: Goldthwait, 07  
 Lake Michigan: Leverett, 89  
 Bear Creek coal field, Mont.: Fisher (C A), 06c  
 Bear Creek ores, Silverton, Colo.: Emmons (W H), 06  
 Bear River district, B. C.: Rush, 09  
 Bear River formation: Stanton, 92; White (C A), 92; Idaho: Mansfield, 16; and fauna: White (C A), 95  
 Beatricea: Billings, 65a; Grant (C C), 90; Hyatt, 65, 65a, 85c; Knott, 85; Shaler, 77  
 Beaver folio, Pa. (no. 134): Woolsey, 05  
 Beaver quadrangle, Pa.: Woolsey, 06a  
 Beaver Lake district, Sask.: Bruce, 14b  
 Beaver Valley, Utah: Lee (W T), 08  
 Beaverdell district, B. C.: Reinecke, 10, 10a, 12  
 Beckwith formation, Idaho: Mansfield, 16  
 Bccraft's Mountain, N. Y.: Davis (W M), 83c  
 Bedford, nomenclature: Cumings, 01; Prosser, 01a; Siebenthal, 01b  
 Bedford fauna, Ky.: Foerste, 09a  
 Bedford oolitic limestone: Hopkins (T C), 97  
 Bedford shale, Ohio: Girty, 12b  
 Beecher, C. E., biography: Bather, 05; Clarke (J M), 04c; Dall, 04d, 06; Jackson (R T), 04; Schuchert, 04b, 06  
 Beekmantown fauna: Seely, 06a  
 Beekmantown formation: Seely, 06a  
 Belemnitella americana and mucronata, habitat: Dorsey, 17  
 Belemnites ambiguus, New Jersey: Roemer, 80  
 Belknap Mountains, N. H.: Pirsson, 06c  
 Bell, Robert, biography: Adams (F D), 17d, e; Camsell, 18d  
 Belle Fourche folio (no. 164), S. Dak.: Darton, 09e  
 Belleville-Breese area, Ill.: Udden, 08d  
 Belleville-Breese folio (no. 195), Ill.: Udden, 15  
 Belly River beds: Hatcher, 03b, d  
 Belly River series, age: Osborn, 03d  
 Belt fauna: Rothpletz, 15  
 Belt formation, Helena, Mont.: Rothpletz, 15  
 Belt series: Hershey, 12b  
 Belvidere beds: Cragin, 95b  
 Benitoite: Baumhauer, 09; Hlawatsch, 09-09b; Louderback, 09; Rogers (A F), 08; composition: Kraus, 08; formula: Blasdale, 08  
 Bennettiteae, proembryo: Wieland, 04a  
 Bentonite.  
 Wyoming: Jamison, 11; Knight (W C), 98b  
 Big Horn basin: Hewett, 17a; Fisher (C A), 06, 06d  
 Black Hills region: Darton, 09  
 Laramie, and Sherman quadrangles: Darton, 10c  
 Laramie Basin: Darton 09f; Siebenthal, 06b  
 Owl Creek Mountains: Darton, 06  
 Berea grit, Ohio: Cushing, 88; Orton, 82a; Read, 83; analyses: Brainerd (J), 74  
 Berea oil sand, Ohio: Griswold, 08; structure: Condit, 16b  
 Berea sandstone formation, Ohio: Burroughs, 13; in eroded Cleveland shale: Burroughs, 14  
 Bering River coal field: Kay, 11, 11a; Martin (G C), 06; Storm, 10a  
 Berkshire geology: Dana (J D), 86  
 Bermuda Islands.  
 Geology: Agassiz (A), 94a, 95; Bristol, 01; Buchan, 00; Bullen, 11; Heilprin, 89; Jones (J M), 66, 72; Kemp (A F), 57; Nelson (R J), 37; Peile, 13; Pirsson, 14a; Scott (A), 57; Stevenson, 97; Verrill, 00, 02a, 07; Vetch, 24.  
*Historical geology.*  
 Boring: Pirsson, 13, 14a  
 General: Nelson (R J), 37; Rice (W N), 84; Stevenson, 97  
*Paleontology.*  
 General: Verrill, 07  
 Infusoria: Bailey (J W), 45d  
 Mollusca: Gulick, 04  
*Petrology.*  
 Lavas: Pirsson, 14b  
*Physical geology.*  
 Changes of level: Tarr, 97h  
*Physiographic geology.*  
 General: Rice (W N), 84  
 Origin of present form: Fewkes, 88, 90  
 Bernardston series: Emerson, 90  
 Berners Bay region, Alaska: Knopf, 11  
 Beryl.  
 Etching figures: Honess, 17  
 Maine: Bastin, 11  
 Beryllium: Baskerville, 08  
 Bethany limestone, Missouri: Bain, 98f; Keyes, 96h  
 Bibliography.  
 Abrasives, United States: U S G S, 11a  
 Acadia: Daly, 01  
 Adams, C. B., writings: Seely, 03  
 Adirondacks: Kemp, 94  
 Agassiz, Louis, writings: Holder, 93; Marcou, 96  
 Alaska, coal: Brooks, 10  
 coal, lignite, and petroleum: Martin (G C), 08



## Bibliography—Continued.

- Alaska: economic geology: Brooks, 06a  
 geology and geography: Brooks, 07  
 Pleistocene mammals: Quackenbush, 09  
 tin: Fay, 07  
 Yakutat Bay region: Tarr (R S), 09
- Alaska Peninsula: Atwood, 11
- Alberta, coal fields: Dowling, 09  
 geology and mining industry: Gwillim, 08
- Alger, Francis, writings: Jackson, 65
- Algonquin and Nipissing shore lines: Goldthwait, 10
- Aluminum, United States: U S G S, 83 (1911)
- Amphibia: Case, 11a
- Anorthosites of Canada: Adams (F D), 96a
- Anthozoa, West Indies: Vaughan, 01
- Antimony in Arkansas: Hess, 08c
- Aquatic life, limb modifications for: Osborn, 06
- Arizona: Darton, 10a; Lutrell, 15  
 Buckskin Mountains: Blanchard, 13  
 Grand Canyon, Shinumo area: Noble, 10  
 southern: Schrader, 15  
 Yuma Co.: Bancroft (H), 11
- Arkansas: Branner, 94, 09; Veatch, 06e; northern; Branner, 00
- Arthrodira: Hussakof, 06
- Artiodactyla: Peterson, 12
- Asbestos: Diller, 11; Hopkins (O B), 14
- Ashburner, C. A., writings: Hill (F A), 94; Winslow, 90b
- Asphalt, United States: U S G S, 83 (1911)
- Avian faunas of Pacific coast: Miller (L H), 12
- Bannock overthrust, Idaho-Utah: Richards (R W), 12
- Barite: Watson (T L), 15
- Barlow, A. E., writings: Adams (F D), 15b
- Baur, George, writings: Wheeler (W M), 99
- Bauxite: Branner, 97
- Beaches, raised, of Ohio: Carney, 09b
- Beecher, C. E., writings: Clarke (J M), 04c, Dall, 06; Jackson (R T), 04; Schuchert, 04b, 06
- Bermuda Islands: Verrill, 07
- Billings, E., writings: Ami, 01i; Walker (B E), 01
- Black Hills region: Ferguson (H G), 08; O'Hara, 00b 10, 17
- Blake, W. P., writings: Babcock, 10; Raymond (R W), 10, 11
- Bowman, Amos, writings: Ami, 95b
- Brachiopoda: Schuchert, 97; Cambrian: Walcott, 08a, 12; old age characters: Shimer, 06
- British Columbia, coal fields: Dowling, 09  
 Field area: Allan, 14  
 geology and mining industry: Gwillim, 08  
 Hedley district: Camsell, 10a  
 Vancouver Island: Clapp (C H), 12
- Broadhead, G. C., writings: Greger, 15
- Brown, A. P., writings: Penrose, 18
- Brush, G. J., writings: Dana (E S), 12; Ford (W E), 12b
- Bryozoa: Nickles, 00; Niagaran: Bassler, 06a
- Buckley, E. R., writings: Buehler, 13
- Buda limestone fauna: Whitney (F L), 11

## Bibliography—Continued.

- Building stone: Merrill (G P), 89; United States: U S G S, 83 (1911)
- Butterflies: Scudder, 75
- Cairnes, D. D., writings: Camsell, 18c
- Calcite: Whitlock, 10
- California: Vogdes, 93a, 96, 04, 05  
 ancient drainage system: Alling, 14  
 glaucophane-bearing rocks: Smith (J P), 06  
 Kern River and Temblor Basin: Anderson (F M), 11  
 Mohave Desert region: Baker, 11  
 San Francisco district: Lawson, 14  
 State Mining Bureau publications: Boalich, 18b; index: Yale, 07  
 Tertiary and Pleistocene: Arnold, 06  
 Tertiary gravels of Sierra Nevada: Lindgren, 11
- Calvin, Samuel, writings: Shimek, 12
- Cambrian: Walcott, 91
- Cambrian Brachiopoda: Walcott, 08a, 12
- Cambrian formations of the Cordilleran area: Walcott, 08a
- Canada: Ami, 99d, 00g, 01e; Malcolm, 16; Reinecke, 12a
- Canada, Geological Survey, index to reports: Dowling, 00; Nicolas, 08  
 publications: Can G S, 09
- Carboniferous invertebrates: Weller, 98
- Caribbean region: Guppy, 05
- Carpenter, F. R., writings: Hofman, 11
- Castillo, Antonio del, writings: Aguilera, 97a; Galindo, 98; Ordóñez, 96
- Cave of Cacahuamilpa: Flores, 10
- Cement materials: Eckel, 13; Virginia: Bassler, 09; United States: U S G S, 83 (1911)
- Cenozoic mammal horizons: Osborn, 09
- Ceratopsia: Lull, 07
- Cerithiidae: Wood (Elvira), 10
- Champsosaurus: Brown (B), 05
- Chapin, J. H., writings: Davis (W M), 93b
- Chazy: Raymond (P E), 06
- Chelonia: Hay (O P), 12a
- Chert: Van Tuyl, 12b; origin: Tarr (W A), 17
- Clark, W. B., writings: Clarke (J M), 18d
- Claypole, E. W., writings: Comstock, 02, 03
- Clays: Branner, 96; Ries, 02a; United States: U S G S, 83 (1911)
- Clays and the ceramic arts: Branner, 06a
- Clinton iron ores: Earle, 14; in New York: Newland, 08a
- Coal, Alaska: Brooks, 10b  
 Canada: Denis, 03a  
 Illinois: Bement, 10  
 Iowa: Lees, 09a
- Coal beds, formation: Stevenson, 11
- Coal flora: Lesquereux, 80
- Coastal drift sands: Olsson-Seffer, 08, 10
- Coastal Plain, North Carolina: Clark (W B), 12
- Cobalt district, Ontario: Hore, 11c; Knight (C W), 11a
- Colorado: Jones (O M), 14  
 Breckenridge district: Ransome, 11  
 Cripple Creek district: Lindgren, 06d  
 Florissant Tertiary lake basin: Henderson (J), 06  
 glacial phenomena: Henderson (J), 10b



## Bibliography--Continued.

- Colorado: Grayback mining district: Patton, 10a  
 Hahns Peak region: George, 09c  
 north central: Henderson (J), 09  
 Permian: Butters, 13  
 Raton Mesa region: Lee (W T), 17  
 San Luis Valley: Siebenthal, 10  
 Color markings in Paleozoic fossils: Roundy, 14  
 Coloration in fossil Mollusca: Greger, 17  
 Comstock, T. B., writings: Ries, 16  
 Concretions: Sheldon, 00  
 Condon, T., writings: Washburne, 07  
 Connecticut: Gregory (H E), 07; Triassic: Lull, 12b, 15  
 Continental shelf off Nova Scotia: Poole, 06c  
 Cook, G. H., writings: Gilbert, 02a; Smock, 94a  
 Cooper, J. G., writings: Raymond (W J), 03  
 Cope, E. D., writings: Frazer, 99, 02a; King, 99  
 Copper: Odendall, 09; United States: U S G S, 83 (1911)  
 Corals: Duerden, 05a; rugose, morphology and development: Brown (T C), 09; Paleozoic, early stages of: Gordon (C E), 06  
 Corundum: Barlow, 15; Pratt, 05  
 Cretaceous: White (C A), 91a  
 Cretaceous plants, catalogue: Knowlton, 98  
 Crustacea, Paleozoic: Vogdes, 90, 93, 95, 17  
 Crystalline rocks: Winchell (N H), 89c  
 Cycads, American fossil: Wieland, 06b  
 Cycadeoideae: Wieland, 16  
 Cyclocystoides: Raymond, 13  
 Daemonelix: Barbour, 97  
 Dakota group, Kansas and Nebraska: Gould, 01e  
 Dall, W. H., writings: Dall, 82a  
 Dan River Triassic coal field, North Carolina: Stone (R W), 12a  
 Dana, J. D., writings: Beecher, 96a; Dana (E S), 95a; Gilman, 99; Le Conte, 96  
 Davis, C. A., writings: Lane, 17a  
 Dawson, G. M., writings: Adams (F D), 03a; Ami, 01, 01c  
 Dawson, J. W., writings: Ami, 00d, e, 01d, i  
 Decay of rocks: Russell, 89a  
 Deltas: Smith (A L), 09  
 Derby, O. A., writings: Branner, 16a  
 Devonian of Wisconsin: Cleland, 11  
 Dinichthyids: Eastman, 97  
 Dinocerata: Marsh, 86  
 Dinosaurs: Huene, 08; Lull, 10a; Versluys, 10; Triassic: Huene, 06  
 Diplodocus: Abel, 10  
 Driftless Area: Shipton, 17  
 Drysdale, C. W., writings: Bancroft (J A), 18, Williams (M Y), 18  
 Dutton, C. E., writings: Diller, 11b, 13  
 Earthquakes, New Madrid: Fuller, 12  
 Echinodermata, Mesozoic and Cenozoic: Clark (W B), 15  
 Echinoidea, American: Stefanini, 12  
 Economic geology: Hopkins (T C), 97f; recent literature on: Loughlin, 10b; Paige, 13c, 14a, b, 15a  
 Economic minerals: Evans (I P), 14  
 Egleston, Thomas, writings: Moses, 00a  
 Eldridge, G. H., writings: Cross, 07b; Emmons, 06e

## Bibliography--Continued.

- Emmons, E., writings: Marcou, 91a  
 Emmons, S. F., writings: Becker, 11; Hague; 12a  
 Enrichment of ores: Clark (J D), 14  
 Entelodontidae: Peterson, 09  
 Eocene: Clark (W B), 91; Atlantic slope: Clark (W B), 96a  
 Eocene plants: Berry, 14  
 Eolian geology: Stuntz, 11  
 Eozoon: Woodward (A), 86  
 Erosion and sedimentation experiments: Jaggar, 08  
 Eskers: Trowbridge, 14b; Rochester district, N. Y.: Giles, 18a  
 Eurypterida: Clarke (J M), 12c; O'Connell, 16  
 Explorations: Hasse, 99  
 Fern ledges, St. John, N. B.: Stopes, 14  
 Fishes: Dean, 16; from Albert shales of New Brunswick: Lambe, 10a  
 Fletcher, Hugh, writings: Brock, 09b  
 Flight in vertebrates: Lull, 06a  
 Florida: Sellards, 08d  
 Florissant fossils: Bather, 09  
 Fontaine, W. M., writings: Watson, 14b  
 Foote, A. E., writings: Kunz, 96  
 Footprints: Hitchcock (E), 58; Triassic and Jurassic: Lull, 04  
 Foraminifera: Woodward (A), 86; Tertiary and Pleistocene: Bagg, 12  
 Fossils, invertebrate: Grabau, 09f  
 Frazer, Persifor, writings: Penrose, 10a  
 Fuel oil: Phillips (W B), 14a  
 Fulgurites: Barrows (W L), 10; Merrill (G P), 86  
 Fuller, H. T., writings: Hovey, 10b  
 Gabb, W. M., writings: Dall, 09  
 Genth, F. A., writings: Barker, 02  
 Geodes: Van Tuyl, 12a  
 Geological survey reports, catalog of: Marsh, 67a; Prime, 79  
 Geological surveys, publications: Anon, 67  
 Geology: Anon, 02  
 Gesner, Abraham, writings: Gesner, 96  
 Glacial geology: Shaler, 81; northeastern North America: Fairchild, 18  
 Glacial lakes: Fairchild, 16a; Ohio: Carney, 09b  
 Glacial lakes Chicago, Algonquin, and Nipissing: Goldthwait, 07  
 Glacial motion: Chamberlin (T C), 04a  
 Glacial phenomena, Colorado: Henderson (J), 10b  
 Glaciers: Shaler, 81  
 Glass sand, United States: U S G S, 83 (1911)  
 Glauconite-bearing rocks of California: Smith, (J P), 06  
 Gold, southern Appalachians: Becker, 95; United States: U S G S, 83 (1911)  
 Grand Canyon of the Colorado: Davis (W M), 01  
 Granite: Dale, 08a; economic geology of: Dale, 07, 09  
 Granites: Watson, 10  
 Graphite deposits of Adirondacks: Bastin, 10a; of Pennsylvania: Miller (B L), 12a  
 Graptolites: Ruedemann, 08  
 Great Lakes, age: Winchell (A N), 97



## Bibliography—Continued.

- Great Lakes region (part), glacial: Leverett, 02, 15  
 Green, W. L., writings: Hitchcock, 00  
 Greenland: Böggild, 17  
 Ground waters: Meinzer, 18  
 Gypsum: Grimsley, 04; United States: U S G S, 83 (1911)  
 Hague, Arnold, writings: Iddings, 18  
 Hall, C. W., writings: Winchell (N H), 12  
 Hall, James, writings: Hovey (H C), 99; Murray, 83; Stevenson, 00  
 Hartt, C. F., writings: Matthew (G F), 90a; Simonds, 97  
 Hatcher, J. B., writings: Osborn, 07i; Schuchert, 05c; Scott, 06  
 Hawn, F., writings: Broadhead, 98a  
 Hay, Robert, writings: Hill (R T), 97c; Thompson (A H), 98  
 Hayden, F. V., writings: White (C A), 93a  
 Hayden, King, Powell, and Wheeler surveys, publications: Schmeckebier, 04  
 Hayes, C. W., writings: Brooks, 17  
 Heilprin, Angelo, writings: Gregory (H E), 09  
 Herrick, C. L., writings: Tipton, 05; Anon, 05  
 Hilgard, E. W., writings: Smith (E A), 17a  
 Hill, F. A., writings: Halberstadt, 17  
 Hitchcock, E., writings: Hitchcock (C H), 95b; Hitchcock (E), 63  
 Holmes, J. A., writings: Pratt, 16a, b  
 Honeyman, D. writings: Gilpin, 90a; McGregor, 94  
 Hovey, H. C., writings: Clarke (J M), 15d  
 Hubbard, O. P., writings: Hovey, 00d  
 Human remains, Vero, Florida: Sterns, 18  
 Hunt, T. S., writings: Pumpelly, 93b  
 Hyatt, Alpheus, writings: Boston Soc N H, 02; Brooks (W K), 09; Crosby, 04d  
 Ichthyosauria, Triassic: Merriam (J C), 08  
 Idaho, Coeur d'Alene district: Ransome, 08  
 Illinois, Chicago district: Alden, 02  
   coal: Bement, 10  
   Evanston-Waukegan region, physical geography of: Atwood, 08a  
 Indiana: Marsters, 94; index to reports: Hopkins (T C), 04b; paleontology: Kindle, 98  
 Insecta: Scudder, 80a, 90b  
 Invertebrata: Marcou (J B), 85b, c, 86a, b; White (C A), 78c, 79e  
 Iowa: Keyes, 93c, 13b  
   artesian wells: Norton, 97  
   Pleistocene: Hay (O P), 14  
 Iron ores: Earle, 14  
   Brewster district, New York: Koeberlin, 09  
   Clinton, of New York: Newland, 08b  
   Hartville iron-ore range: Ball, 07b  
   United States: U S G S, 11a  
   Virginia: Eckel, 06c  
 Jackson, C. T., writings: Woodworth, 97a  
 James, J. F., writings: Gilbert, 98c; Stanton, 98  
 James, U. P., writings: James (J F), 89a  
 John Day region: Merriam, 07  
 Johns Hopkins University, Department of Geology: Mathews, 13  
 Jorullo, volcano: Villafañá, 07  
 Kansas: Hay (R), 96c  
 Kerr, W. C., writings: Holmes, 87

## Bibliography—Continued.

- King, Clarence, writings: Emmons (S F), 02b, c, 07c; Raymond (R W), 03  
 Knight, W. C., writings: Barbour, 04; Williston, 04b  
 Lacoe, R. D., writings: Hayden (H E), 01; White (D), 03a  
 Laffamme, J. C. K., writings: Clarke (J M), 11e  
 Lake City district, Colorado: Irving, 11a  
 Lake ramparts: Gilbert, 08  
 Lake Superior region: Van Hise, 11; Wadsworth, 80; Winchell (H V), 94  
 Lance formation, Niobrara Co., Wyo.: Lull, 15c  
 Langton, D. W., writings: Smith (E A), 10  
 Lapham, I. A., writings: Winchell (N H), 94a  
 Lead, United States: U S G S, 83 (1911); upper Mississippi Valley: Bain, 06; Grant (U S), 06; Virginia-Tennessee: Watson, 06a  
 Lead and zinc, northwestern Ill.: Cox (G H), 14  
 Le Conte, Joseph, writings: Christy, 02; Fairchild, 15; Hilgard, 06c  
 Leidy, Joseph, writings: Eyerman, 91a; Osborn, 13e; Ruschenberger, 92  
 LeRoy, O. E., writings: Schofield, 18  
 Lesley, J. P., writings: Stevenson, 04a  
 Lesquereux, Leo, writings: Orton, 90b  
 Lewis, H. C., writings: Upham, 88b; Woodward (H), 88  
 Lignite, Mississippi: Brown (C S), 07; Montana, Rowe, 06  
 Limbs, modifications for aquatic life: Osburn, 06  
 Lime, United States: U S G S, 11a  
 Literature on geology: Condit, 16c  
 Lithology, 1887 and 1888: Merrill (G P), 90a  
 Lockatong formation, Triassic: Hawkins, 14  
 Locke, John, writings: Winchell (N H), 94d  
 Loess: Cable, 16  
 Logan, William, writings: Harrington (B J), 83  
 Loughridge, R. H., writings: Smith (E A), 18  
 Louisiana: Veatch, 06e, g; Eocene paleontology: Vaughan, 96  
 Lymnæidæ: Baker (F C), 11  
 McCalley, H., writings: Smith (E A), 05c, 06  
 McGee, W. J., writings: Knowlton, 13c; McGee, 15  
 Maclure, William, writings: Morton, 41, 44  
 Madreporaria Fungida: Vaughan, 05  
 Magnesite, United States: U S G S, 83 (1911)  
 Magnetite deposits of Adirondacks: Newland, 08  
 Maine: Babb, 13; ore deposits: Emmons (W H), 10a  
 Mammalia, modifications of occipital condyles: Mead (C S), 06  
 Mammalia, Pleistocene, of Alaska: Quackenbush, 09  
 Mammalian molar teeth, evolution of: Osborn, 07g  
 Mammoth Cave: Hovey (H C), 12a, 14  
 Man, fossil, in America: Winchell (N H), 07a  
 Manganese, United States: Harder, 10a; U S G S, 83 (1911)  
 Manhattan schist, N. Y.: Fettke, 14  
 Manitoba, coal fields: Dowling, 09  
 Maps: Marcou, 93



## Bibliography—Continued.

- Marble: Dale, 12, 14  
 Marshes: Penhallow, 07b  
 Maryland: Mathews, 97  
   Allegany Co.: O'Harra, 00  
   Anne Arundel Co.: Little, 17  
   Calvert Co.: Shattuck, 07  
   Devonian: Prosser, 13a  
   Eocene: Clark (W B), 01  
   Garrett Co.: Martin (G C), 02  
   Lower Cretaceous: Clark (W B), 11  
   Miocene: Clark (W B), 04  
   Pliocene and Pleistocene: Shattuck, 06  
   St. Mary's Co.: Shattuck, 07a  
   Upper Cretaceous: Clark (W B), 16  
 Marsh, O. C., writings: Beecher, 99; Marsh, 98g  
 Massachusetts, Essex Co.: Sears, 94b, 05  
   Hampshire Co.: Emerson, 98  
   Nantucket Island: Cushman, 06; glacial geology: Wilson (J H), 06  
   Sankoty Head Pleistocene deposits: Cushman, 06  
   Winthrop shore lines: Roorbach, 10  
 Mather, W. W., writings: Hitchcock (C H), 97  
 Maxville limestone: Morse, 10  
 Mazon Creek shales fauna: Moodie, 13a  
 Meek, F. B., writings: Marcou (J B), 85c; White (C A), 96, 02a  
 Meguma series of Nova Scotia: Wolff, 08a  
 Mesozoic Echinodermata: Clark (W B), 93  
 Mesozoic Invertebrata: Boyle, 93  
 Metals, rarer, United States: U S G S, 83, (1911)  
 Mexico: Aguilar, 98, 02, 08, 16, 18; Thayer, 14  
   Cananea district: Emmons (W H), 10a  
   cave of Cacahuamilpa: Flores, 10  
   Cretaceous coal fields: Aguilera, 09c  
 Michigan, glacial geology: Leverett, 04a  
   Lake Superior region: Winchell (H V), 94  
 Mills, J. E., writings: Branner, 04  
 Mineral paints: U S G S, 83 (1911)  
 Mineralogy: Foote (A E), 92; Anon, 02  
 Minerals, Galena-Joplin district: Rogers (A F), 04a  
 Minnesota: Gregory (W), 15; Winchell (N H), 73a; mineralogy; Winchell (N H), 85h  
 Mississippi: Hilgard, 00  
 Missouri: Keyes, 96a; Sampson, 90  
 Mohave Desert region: Baker (C L), 11  
 Mollusca, post-Eocene marine, of northwest coast of America: Dall, 09c  
 Molybdenum: Horton, 16  
 Monazite: Nitze, 95, 95a  
 Montana, coal and lignite: Rowe, 06  
   Great Falls region: Fisher, (C A) 09, 09a  
 Monte Pelé: Lacroix, 08  
 Morrison formation: Mook, 16  
 Morton, S. G., writings: Meigs, 51  
 Mounds, natural, origin: Campbell (M R), 06b  
 Mudge, B. F., writings: Williston, 99d  
 Natural gas: Peckham, 87  
 Nebraska: Barbour, 02a; Survey publications; Barbour, 10  
 Nevada, Goldfield district: Ransome, 09  
   Humboldt Co.: Ransome, 09d  
 Newark system: Russell, 92  
 Newberry, J. S., writings: Britton (N L), 93; Fairchild, 93; Hollick, 95a; Kemp, 93a, b, c; Stevenson, 93b; White (C A), 06

## Bibliography—Continued.

- New Brunswick: Kain, 95; Bathurst district: Young, 11a  
 New Jersey: Black, 16; Passaic quadrangle: Darton, 08b  
 New Madrid earthquake: Fuller, 12; Sampson, 13  
 New Mexico: Darton, 10a  
   coal fields, stratigraphy: Lee (W T), 12b  
   Nacimiento group: Gardner, 10e  
   Raton Mesa region: Lee (W T), 17  
   Sierra and Socorra cos.: Lindgren, 10  
 New York: Ellis, 03  
   Elizabethtown and Port Henry quadrangles: Kemp, 10c  
   Finger Lake region: Tarr, 94a  
   geological maps: Leighton, 09  
   Long Island: Fairchild, 17a; Veatch, 06c  
   maps: Merrill (F J H), 02b  
   Orange Co.: Ries, 97b  
   Pleistocene: Fairchild, 09; Woodworth, 05, 05a  
   Poughkeepsie quadrangle: Gordon (C E), 11  
   pre-Cambrian: Kemp, 12c  
   Schoharie Valley: Grabau, 06  
   1876-1893: Clarke (J M), 94c  
 Niagara Bryozoa: Bassler, 06a  
 Niagara Falls: Haskell, 13.  
 Nickel: R Ont Nickel Comm, 17  
 Niles, W. H., writings: Barton, 12.  
 Nipissing silver field: Hore, 11c  
 North American geology: Darton, 87, 89, 91, 91a, 92, 96; Marcou, 58; Merrill (F J H) 87c; Nickles, 09; Weeks, 96, 02  
 North American stratigraphy: Willis, 12  
 North Carolina, Cid mining district: Pogue, 10  
   Coastal Plain: Miller (B L), 12c  
   geology, mineralogy, and geography: Laney, 09  
   Gold Hill district: Laney, 10  
 Norwood, J. G., writings: Broadhead, 95a  
 Notharctus and Lemuroidea: Gregory (W K), 15b  
 Nova Scotia, Arisaig section: Twenhofel, 09  
   Arisaig-Antigonish district: Williams (M Y), 14  
   gold-bearing slates: Woodman, 99b  
 Ocher deposits, Pennsylvania: Stoddard, 10  
 Ohio: Derby, 06; Prosser (M W), 06  
   glacial lakes: Carney, 09b  
   Maxville limestone: Morse, 10.  
 Oil shale: Winchester, 16a  
 Oklahoma: Trout, 15  
 Olenellus and other Mesonacidæ: Walcott, 08a  
 Olivine diabase in United States: Pogue, 10a  
 Ontario, Devonian: Stauffer, 15  
   Nipigon Basin: Wilson (A W G), 10  
 Oolite: Brown (T C), 14; Hopkins (T C), 97a  
 Ore genesis: Irving, 13b  
 Oregon: Henderson, 12; Cascades: Smith (W D), 17  
 Orton, Edward, writings: Gilbert, 00b; White (I C), 00  
 Osborn, H. F., writings: Osborn, 00j; Ripley, 11, 16  
 Owen, R., writings: Stanley-Brown, 94  
 Paint-ore deposits, Pennsylvania: Agthe, 10



## Bibliography—Continued.

- Paleontology, invertebrate: Keyes, 90b, 91e, 94b; Marcou (J B), 84, 85a, 86b, 87, 88, 89; White (C A), 80g, 81g, 82c, g; Williams, 90a; Anon, 02
- Panama, Tertiary fauna: Toulou, 09
- Peat: Bastin, 09a; Davis (C A), 10b; Holmes, 06; Parmelee, 06; Iowa: Lees, 09b
- Pectens, Tertiary and Pleistocene: Arnold, 06
- Penfield, S. L., writings: Iddings, 08; Wells, 07; Pirsson, 06
- Penhallow, David Pearce, writings: Barlow, 11
- Pennsylvania, graphite deposits: Miller (B L), 12a
- publications on geology: Stone (R W), 08a
- Percival, J. G.: Shepard, 59c
- Permian reptiles: Case (E C), 07a, 11
- Petroleum: Breger, 12a; Peckham, 87
- Mexico: Stewart (P C A), 15
- southern California: Eldridge, 07
- 1915: Burroughs, 18
- Petroleum and natural gas in western Pennsylvania: Munn, 08
- Petrology: Johannsen, 14b; Pirsson, 18; Anon, 02
- Phosphate: Penrose, 88
- Florida: Matson, 15; Sellards, 13a
- United States: Mansfield (G R), 17; U S G S, 83 (1911)
- Physiographic geology: Gregory (H E), 18a
- Physiography: Lobeck, 18
- Phytosauria: McGregor, 06
- Pisces: Dean, 16
- Placodermata, Arthrodira: Hussakof, 06
- Platt, F., writings: Frazer, 01a
- Pleistocene, California: Arnold, 06
- Maryland: Shattuck, 06
- New York: Fairchild, 09
- South Carolina: Pugh, 05
- Pleistocene mammals of Alaska: Quackenbush, 09
- Pliocene, Maryland: Shattuck, 06
- Porto Rico: Berkey, 15a
- Potholes: Barker, 13
- Powell, J. W., writings: Warman, 03a
- Prairies: Shimek, 11
- Pre-Cambrian geology: Kemp, 11c; Steidtmann, 15; Van Hise, 09a
- Prosser, C. S., writings: Cumings, 17
- Protostega: Case, 97a
- Psymphyllum: Arber, 10, 12
- Purdue, A. H., writings: Ashley, 18b
- Fyrite, United States: U S G S, 83 (1911)
- Quebec, Anticosti: Schmitt, 04
- copper: Bancroft (J A), 15
- Quebec: Marcou, 91
- Quicksilver: Bradley (W W), 18a
- Raton Mesa region, Colo. N.-Mex.: Lee (W T), 17
- Record for 1887-1888: McGee, 90b
- Rhode Island: Providence Franklin Soc, 87
- Rock weathering: Buckman (H O), 11
- Roemer, F. V., writings: Simonds, 02a
- Rogers, H. D., writings: Gregory (J W), 16
- Rogers, W. B., writings: Rogers (W B), 96
- Rominger, C. L., writings: Merrill (G P), 08a
- Russell, I. C., writings: Willis, 03

## Bibliography—Continued.

- Safford, J. M., writings: McGill, 17; Stevenson, 09a
- St. Peter sandstone: Sardeson, 96a
- St. Vincent, eruption at the Soufrière, 1902-3: Fleet, 08
- Salines, United States: U S G S, 83 (1911)
- Salvador: Fleury, 17
- Sand: Hopkins (L L), 18
- Sand formations on marine coasts: Olsson-Seffer, 10
- Sand-lime brick: Parr, 12
- Sandstone: Hopkins (T C), 96
- San Lorenzo series, Cal.: Clark (B L), 18b
- Saskatchewan, coal fields: Dowling, 09
- Schoolcraft, H. R., writings: Anon, 90a
- Scudder, S. H., writings: Dimmock, 79
- Seely, H. M., writings: Perkins (G H), 18
- Selwyn, A. R. C., writings: Ami, 03
- Serpentine, origin: Benson, 18
- Shaler, N. S., writings: Shaler, 09; Wolff, 08a
- Shore lines in Vermont: Merwin, 08
- Shufeldt, R. W., writings: Shufeldt, 87
- Shumard, B. F., writings: Winchell (N H), 89e
- Silliman, Benjamin, writings: Wright (A W), 11
- Silurian, Arisaig section, Nova Scotia: Twenhofel, 09
- Silver, United States: U S G S, 83 (1911)
- Slate: Dale, 06c, 14
- Slate belt, New York and Vermont: Dale, 99
- Smith, J. J., writings: Silliman (jr), 86
- South Carolina, Pleistocene: Pugh, 05
- South Dakota, Black Hills: Ferguson, 08; O'Harra, 00b, 17
- Stearns, R. E. C., writings: Stearns, 11
- Stromatoporoids, Ordovician: Parks, 10; Niagara: Parks, 08
- Sulphur, United States: U S G S, 83 (1911)
- Survey reports, catalog: Marsh, 67a; Prime, 79
- Swallow, G. C., writings: Broadhead, 99
- Taconic: Marcou, 87
- Taconic system: Dana, 80a
- Talc: Hopkins (O B), 14
- Tantalum: Hess, 09
- Tarr, R. S., writings: Martin (L), 15a; Woodworth, 13a
- Tennessee: Cockrill, 11; lead and zinc: Watson, 06a
- Terracing, river: Fisher (E F), 06
- Tertiary, California: Arnold, 06
- correlation and paleogeography: Osborn, 12g
- land connection between North and South America: Scharff, 09, 09a
- plants, catalog: Knowlton, 98
- Texas: Simonds, 00; El Paso quadrangle: Richardson (G B), 09; fuels: Phillips, 13
- Thaumasite: Butler, 11a
- Thompson, Zadock, writings: Perkins (G H), 02a
- Tight, W. G., writings: Bownocker, 11
- Tin: Ferguson, 12; Hess, 09, 12c; Alaska: Fay, 07
- Trask, J. B., writings: Vogdes, 07
- Triassic Ichthyosauria: Merriam, 03
- Triassic marine invertebrates: Smith (J P), 14
- Trilobita, Silurian of North America: Weller, 07a



## Bibliography—Continued.

- Trinidad, geology: Cadman, 08  
 Troost, G., writings: Glenn, 05b  
 Tungsten: George (R D), 09b; Hartman, 18;  
     Van Wagenen, 06; Walker (T L), 09  
 Tuomey, Michael, writings: Smith (E A), 97  
 Turquoise: Pogue, 15; Zalinski, 07c  
 Turtles, Protostegidæ: Wieland, 09  
 Underground waters: Fuller, 05k  
 U. S. Geological Survey: Inst. Government  
     Research, 18; publications: Warman, 93,  
     01, 03  
 Uranium: George (R D), 11  
 Utah, Toqueville district: Huntington, 04  
     Park City district: Boutwell, 12  
     Wasatch Mountains: Hintze, 13  
 Vanadium: George (R D), 11  
 Vancouver Island: Clapp (C H), 12  
 Vermont: Perkins (G H), 02b, 04; Richardson  
     (C H), 06  
     Green Mountain region: Perkins (G H), 12  
     Orange Co.: Richardson (C H), 02  
 Vertebrata: Hay (O P), 02  
 Vertebrate limbs, origin: Osborn, 07  
 Vertebrate paleontology: Eyermann, 90, 91, 92,  
     93  
 Vertebrates, flight of: Lull, 06a  
 Virginia: Watson, 97a, 07e  
     cement resources: Bassler, 09  
     Coastal Plain: Clark (W B), 12b  
     iron: Eckel, 06c  
     lead and zinc: Watson, 06a  
 Volcanic ash: Rowe, 03; Woolsey, 06  
 Volcanic eruptions, West Indies: Hovey, 04e  
 Volcanism: Iddings, 14  
 Volcano Jorullo: Villafañã, 07  
 Volcanoes, Soufrière of St. Vincent: Flett, 08  
 Wachsmuth, C., writings: Calvin, 97d; Keyes,  
     96d  
 Walcott, C. D., writings: Marcou (J B), 85c  
 Washington: Arnold, 02; O'Donnell, 13  
     coal: Daniels, 14  
     mineral resources: Fischer, 18  
     western: Weaver, 16  
 West Indian volcanic eruptions: Hovey, 04j  
 West Indies: Guppy, 12; Anthozoa: Vaughan,  
     01  
 West Virginia: Brown (S B), 01  
 White, C. A., writings: Dall, 11b; Marcou (J B),  
     85c; Stanton, 98a, 11  
 White, T. G., writings: Kemp, 03d; Ries, 01b  
 Whiteaves, J. F., writings: Anon, 06a  
 Whitfield, R. P., writings: Clarke (J M), 11f;  
     Gratacap, 11  
 Whitney, J. D., writings: Brewster, 09  
 Whittlesey, Charles, writings: Baldwin, 87  
 Williams, G. H., writings: Clark (W B), 95;  
     Clarke (J M), 95; Johns Hopkins Univ,  
     94; Williams (T), 96  
 Williams, J. F., writings: Kemp, 92  
 Willmott, A. B., writings: Coleman, 16a  
 Winchell, Alexander, writings: Winchell  
     (N H), 92c  
 Winchell, N. H., writings: Upham, 15a  
 Windward Islands volcanic eruptions: Russell,  
     02b

## Bibliography—Continued.

- Wisconsin, Devonian: Cleland, 11  
     Lake Superior sandstones: Thwaites, 12  
     Milwaukee, Hamilton formation: Teller, 00  
     southeastern: Alden, 18  
 Wolframite: Hess, 14  
 Worthen, A. H., writings: Bliss (N W), 90;  
     White (C A), 95a  
 Wright, A. A., writings: Wilder, 07; Wright  
     (G F), 05a  
 Wyoming: Bovee, 18  
     alkali deposits: Schultz, 10b  
     Big Horn Basin: Sinclair, 12b  
     Fremont Co.: Jamison, 11a  
     Salt Creek oil field: Wegemann, 11  
 Xinantecatl: Flores, 06  
 Yellowstone National Park: Peale, 83  
 Yukon, geology and mining industry: Gwillim,  
     08  
 Zinc, upper Mississippi Valley: Bain, 06;  
     Grant (U S), 06  
     Virginia-Tennessee: Watson, 06a  
     United States: U S G S, 11a  
 Bidwell Bar folio, Cal. (no. 43): Turner, 98  
 Big Horn Basin, Wyo.: Fisher (C A), 06, 06d;  
     Washburne, 09; Woodruff, 09a, 10  
 Bighorn coal basin, Alta: Malloch, 09, 11  
 Big Horn dolomite, origin: Blackwelder, 13b  
 Big Horn Mountains: Darton, 06b, e, g; glacial:  
     Salisbury, 06b; glacial sculpture: Matthes,  
     00  
 Big Muddy dome, Wyo.: Barnett, 14b  
 Big Trees folio, Cal. (no. 51): Turner, 98a  
 Billings, E., biography: Ami, 01i, j; Whiteaves,  
     77b; Anon, 77  
 Billingsia: Ford (S W), 86a  
 Bilobites: Beecher, 91a; Catskill Mountains: Dekay,  
     23  
 Bingham mining district, Utah: Boutwell, 05e  
 Biography.  
     American authors: Miller (S A), 82; Whitney,  
     82a  
     Adams, C. B.: Seely, 03  
     Agassiz, Alexander: Murray, 11  
     Agassiz, Louis: Agassiz (E C), 85; Holder, 93;  
     Marcou, 96; Walcott, 07  
     Alger, Francis: Jackson, 65  
     Ashburner, C. A.: Lesley, 90, 90a, b; Winslow,  
     90b  
     Bain, Francis: Watson (L W), 03  
     Barlow, A. E.: Adams (F D), 15b; White (J),  
     14  
     Barris, W. H.: Preston (C H), 01  
     Baur, George: Hay (O P), 98c; Wheeler (W M),  
     99  
     Beecher, C. E.: Bather, 05; Clarke (J ), 04c;  
     Dall, 04d, 06; Jackson (R T), 04; Schu-  
     chert, 04b, 06  
     Bell, Robert: Adams (F D), 17d, e; Camsell, 18d  
     Billings, E.: Ami, 01i, j; Whiteaves, 77b; Anon,  
     77  
     Blake, W. P.: Raymond (R W), 10, 11; Anon,  
     10b  
     Bouvé, T. T.: Crosby, 96a  
     Bowman, Amos: Ami, 95b  
     Brewer, W. H.: Jenkins, 11  
     Broadhead, G. C.: Greger, 15



## Biography—Continued.

Brooks, T. B.: Willis, 01b  
 Brown, A. P.: Penrose, 18; Wherry, 18d  
 Brush, G. J.: Dana (E S), 12; Ford (W E), 12b; Warren, 16a  
 Buckley, E. R.: Buehler, 13; Anon, 12.  
 Cairnes, D. D.: Camsell, 18c  
 Calvin, Samuel: Bain, 11a; Kay, 11b; Shimek, 12  
 Carpenter, F. R.: Hofman, 10, 11  
 Castillo, Antonio del: Aguilera, 97a; Galindo, 98; Ordóñez, 96  
 Caswell, J. H.: Kemp, 10d  
 Chapin, J. H.: Davis (W M), 93b  
 Clark, W. B.: Berry, 17j; Clarke (J M), 18d; Mathews, 18; Anon, 15  
 Claypole, E. W.: Comstock, 02, 03; Winchell (N H), 01b  
 Comstock, T. B.: Ries, 16  
 Condon, Thomas: Condon, 10; Meany, 06; Oreg Univ, 06; Washburne, 07  
 Conrad, T. A.: Abbott (C C), 95  
 Cook, G. H.: Gilbert, 02a; Neilson, 91; Smock, 89b; Anon, 90b  
 Cooper, J. G.: Raymond (W J), 02  
 Cope, E. D.: Benjamin, 10a; Frazer, 97a, 00; Gill, 97; King, 99; Kingsley, 97a; Osborn, 97f, g, 07g, and in Cope, 98; Scott, 98c; Woodward (A S), 97  
 Cox, E. T.: Merrill (G P), 08b  
 Cozzens, I.: Vodges, 99  
 Dana, J. D.: Beecher, 96a; Clarke (J M), 13c; Dana (E S), 95a; Farrington, 95a; Gilman, 99; Hadley, 07, 13; Hovey, 13b; Le Conte, 96; Merrill (G P), 13; Powell, 96; Rice (W N), 10, 13, 15; Schuchert, 15a; Williams (H S), 95b  
 Davis, C. A.: Lane, 16a, 17a  
 Davis, W. M.: Huntington, 12  
 Dawson, G. M.: Adams (F D), 01c, 03a; Ami, 01k; Harrington, 01; Hinde, 97  
 Dawson, J. W.: Adams (F D), 99b, 00b, 01b; Ami, 00d, i; Dawson (J W), 01  
 Deane, James: Bouvé, 58  
 Derby, O. A.: Branner, 16a  
 Drysdale, C. W.: Bancroft (J A), 18; Jacobs (E), 17; Williams (M Y), 18  
 Dutton, C. E.: Becker, 12; Diller, 11b, 13  
 Dwight, W. B.: Merrill (F J H), 08  
 Eastman, C. R.: Dean (B), 18  
 Eaton, Amos: Anon, 90c  
 Egleston, Thomas: Kunz, 02; Martin (D S), 99a; Moses, 00a, b  
 Eights, James: Clarke (J M), 16b  
 Eldridge, G. H.: Cross, 07b; Emmons (S F), 06e  
 Ells, R. W.: Bishop, 12  
 Emmons, E.: Marcou, 85a, 91a; Perry, 69a; Anon, 96  
 Emmons, S. F.: Bain, 11; Becker, 11, 13; Cross, 11b; Hague, 12a; Pirsson, 11b; Ransome, 11a; Anon, 11, 11a  
 Engelmann, George: White (C A), 02  
 Evans, John: Shumard (B F), 63e  
 Featherstonhaugh, G. W.: Featherstonhaugh, 89  
 Fletcher, Hugh: Brock, 09b; Schuchert, 09b

## Biography—Continued.

Fontaine, W. M.: Watson, 14b  
 Foote, A. E.: Kunz, 96  
 Frazer, Persifer: Harrison (A C), 09; Penrose, 10a  
 Fuller, H. T.: Hovey, 10b  
 Gabb, W. M.: Dall, 09  
 General: Miller (S A), 82; Whitney, 82a  
 Genth, F. A.: Barker, 02  
 Gesner, Abraham: Gesner, 96; Matthew (G F), 97a  
 Gilbert, G. K.: Davis (W M), 18c; Fairchild, 18c  
 Giroux, N. J.: Ells, 97b  
 Gratacap, L. P.: Kunz, 18a; Stanton (G S), 18  
 Green, W. L.: Hitchcock (C H), 00  
 Hague, Arnold: Diller, 17; Iddings, 18  
 Hague, J. D.: Raymond (R W), 09  
 Hall, C. M.: Upham, 03a, 04f  
 Hall, C. W.: Martin (L), 13a; Winchell (N H), 12  
 Hall, James: Barrois, 99; Clarke (J M), 99f; Emerson, 96; Gratacap, 98; Hovey (H C), 99; McGee, 96c; Nevius, 98; Stevenson, 00; Anon, 84  
 Harrington, B. J.: Adams (F D), 08  
 Harris, I. H.: Schuchert, 03a  
 Hartt, C. F.: Hay (G U), 99; Matthew (G F), 90a; Simonds, 97  
 Hatcher, J. B.: Eaton (G F), 04; Holland, 04; Osborn, 07i; Schuchert, 05c; Scott, 04, 06  
 Hawn, F.: Broadhead, 98a  
 Hay, Robert: Hill (R T), 97c; Thompson (A H), 98  
 Hayden, F. V.: Cope, 88u; Peale, 90; Powell, 89b; White (C A), 93a; Anon, 88a  
 Hayes, C. W.: Brooks (A H), 17; White (D), 16a  
 Heilprin, Angelo: Gregory (H E), 09; Levy, 07; Pirsson, 07a; Anon, 07, 07a  
 Herrick, C. L.: Bawden, 5; Cole (A D), 04, 05; Tight, 05  
 Hilgard, E. W.: Smith (E A), 17a  
 Hill, F. A.: Halberstadt, 17  
 Hinde, G. J.: O'Connell, 18  
 Hitchcock, C. H.: Anon, 98a  
 Hitchcock, Edward: Hitchcock (C H), 95b; Hitchcock (E), 63; Lesley, 77a; Anon, 95a  
 Holmes, J. A.: Pratt, 16a, b; Anon, 15b  
 Honeyman, David: Gilpin, 90a; Lawson (G), 90; M (J), 90  
 Houghton, Douglass: Bradish, 89; Russell, 04c; Winchell (A), 89e; Anon, 48, 99a  
 Hovey, H. C.: Clarke (J M), 15d  
 Howell, E. E.: Gilbert, 11, 12  
 Hubbard, Bela: Russell, 04d  
 Hubbard, L. L.: Lane, 00e  
 Hubbard, O. P.: Hovey, 00d; Stevenson, 00b  
 Hunt, T. S.: Dawson (J W), 92; Douglas, 93; Frazier, 93; Laflamme, 92a; Pumpelly, 93b  
 Hyatt, Alpheus: Brooks (W K), 09; Crosby, 04d; Dall, 02; Jackson (R T), 13; Mayer, 11; Stanton, 03a; Tarr, 85  
 Irving, J. D.: Kemp, 18, 18a; Lindgren, 18d, e



## Biography—Continued.

- Irving, R. D.: Chamberlin (T C), 89; Powell, 89c; Russell, 90b  
 Jackson, C. T.: Woodworth, 97a  
 James, J. F.: Gilbert, 98c; Stanton, 98  
 James, U. P.: James (J F), 89a  
 Kerr, W. C.: Holmes, 87  
 King, Clarence: Emmons (S F), 02b, c, 07c; Hague (J D), 04; Raymond (R W), 03  
 Knight, W. C.: Barbour, 04; Nelson (A), 03; Williston, 04b  
 Lacoe, R. D.: White (D), 01d, 03a  
 Laflamme, J. C. K.: Clarke (J M), 11e  
 Langton, D. W.: Smith (E A), 10  
 Lapham, I. A.: Mann, 76; Winchell (N H), 94a  
 Lea, Isaac: Anon, 86a  
 Le Conte, Joseph: Christy, 02; Fairchild, 15; Hilgard, 06c; Lawson, 01; Le Conte, 03; Stevenson, 02a  
 Leidy, Joseph: Brooks (W K) 07; Chapman, 07; Frazer, 92; Minot, 13; Osborn, 13d; Ruschenberger, 92  
 LeRoy, O. E.: Schofield, 18  
 Lesley, J. P.: Ames, 09; Chance, 06; Davis (W M), 15e; Frazier, 03; Halberstadt, 03, Lyman, 03a; Stevenson, 03a, 04a  
 Lesquereux, Leo: Lesley, 90c, 95; Orton, 90b  
 Leverett, Frank: Keyes, 00j  
 Lewis, H. C.: Upham, 88b, 89e; Woodward (H), 88  
 Locke, John: Winchell (N H), 94d  
 Logan, W. E.: Bell (R), 08; Harrington, 76a, 83  
 Lonsdale, E. H.: Keyes, 98d  
 Loughridge, R. H.: Smith (E A), 18  
 Lucas, A. F.: McBeth (R S), 18  
 McCalley, H.: Smith (E A), 05c, 06  
 Macfarlane, J.: White (I C), 91a  
 McGee, W J: Darton, 15b; Keyes, 13f; Knowlton, 13c; McGee, 15; Wash Ac Sc, 13; Anon, 12a  
 Maclure, William: Morton, 41, 44  
 Marcy, O.: Crook, 99, 00  
 Marsh, O. C.: Ami, 99e; Beecher, 99; Grinnell, 78, 10; Hague, 00; Joly (H), 01; Woodward (H), 99a; Wortman, 99  
 Mather, W. W.: Hitchcock (C H), 97  
 Meek, F. B.: White (C A), 77f, 96, 02a  
 Miller, S. A.: Bather, 98b; Billings (W R B), 98  
 Miller, W. G.: Lamb, 13a  
 Mills, J. E.: Branner, 04  
 Morton, S. G.: Meigs, 51  
 Mudge, B. F.: Parker (J D), 81a; Williston, 99d  
 Murray, Alexander: Bell (R), 92b  
 Nason, H. B.: Chamberlin, 96b  
 Neff, P.: Cushing, 04  
 Nettleroth, Henry: Bassler, 09b  
 Newberry, J. S.: Britton (N L), 93; Dawson (J W), 93b; Hollick, 95a; Kemp, 93a, b; Orton, 96; Stevenson, 93b; White (C A), 06  
 Nicollet, Jean: Winchell (H V), 94a  
 Nicollet, J. N.: Winchell (N H), 91d; Winchell (H V), 94a  
 Niles, W. H.: Barton, 11  
 Norwood, J. G.: Broadhead, 95a  
 Orton, Edward: Gilbert, 00a, b; Hobbs, 02c; Hovey, 99a; Ohio St Univ, 99; Stevenson, 00a; White (I C), 00; Anon, 00

## Biography—Continued.

- Osborn, H. F.: Woodward (A S), 17  
 Owen, D. D.: Peter (R), 61a; Anon, 61, 89  
 Owen, Richard: Jordan, 97; Winchell (N H), 90  
 Penfield, S. L. Iddings, 08; Miers, 07; Pirsson, 06; Wells, 06, 07  
 Penhallow, D. P.: Barlow, 11; Jeffrey, 11a  
 Percival, J. G.: Pettee, 91; Ward (J H), 66  
 Pettee, W. H.: Russell, 06  
 Platt, Franklin: Frazer, 01a  
 Powell, J. W.: Brewer (W H), 02; Dall, 05a; Davis (W M), 15d; Dellenbaugh, 18; Gilbert, 02b, 03, 03a; Langley, 02; Merrill (G P), 03a; Walcott, 03a; Anon, 82  
 Prosser, C. S.: Clarke (J M), 16a; Cumings, 17  
 Purdue, A. H.: Ashley, 18b; Glenn, 18  
 Redfield, W. C.: Olmsted, 57; Rogers (W B), 57c  
 Roemer, F.v.: Simonds, 02a  
 Rogers, H. D.: Gregory (J W), 16; Anon, 96a  
 Rogers W. B.: Mendenhall (T C), 97; Rogers (W B), 96; Walker (F A), 95  
 Rominger C. L.: Merrill (G P), 08a  
 Rowe, R. B.: Prosser, 02c  
 Russell, I. C.: Davis (C A), 06a; Gilbert, 06c; Lane, 18; Leverett, 06c; Lombard, 06; Pirsson, 06a; Willis, 08  
 Safford, J. M.: McGill, 17; Stevenson, 09a  
 Schoolcraft, H. R.: Anon, 90a  
 Scudder, S. H.: Cockerell, 11d; Anon, 11b  
 Seely, H. M.: Perkins (G H), 18  
 Selwyn, A. R. C.: Ami, 03, 05, 07a; Barlow, 02b; Woodward (H), 99  
 Shaler, N. S.: Davis (W M), 06e, f; Hobbs, 07g, Shaler, 09; Wolff, 08a  
 Shephard, C. W.: Anon, 95  
 Shumard, B. F.: Winchell (N H), 89e  
 Silliman, Benjamin: Caswell, 77; Fisher (G P), 66; Anon, 65  
 Silliman, Benjamin (jr.): Hunt, 85d; Wright (A W), 11; Anon, 80a, 85  
 Simpson, G. B.: Clarke (J M), 02c  
 Smith, J. L.: Silliman (jr.), 86  
 Springer, Frank: Keyes, 96n  
 Stearns, R. E. C.: Dall, 11  
 Sternberg, C. H.: Sternberg, 09  
 Suess, Eduard: Hobbs, 14b  
 Sutton, W. J.: Robertson (W F), 16  
 Swallow, G. C.: Broadhead, 99  
 Tarr, R. S.: Brigham (A P), 15; Martin (L), 15a; Williams (H S), 12a; Woodworth, 13a; Anon, 12b  
 Thompson, Zadock: Houghton, 56; Kneeland, 56; Perkins (G H), 02a  
 Tight, W. G.: Bownocker, 11  
 Trask, J. B.: Stearns, 08; Vogdes, 07  
 Troost, G.: Glenn, 05b  
 Tuomey, Michael: Rogers (W B), 57b; Smith (E A), 97  
 Van Hise, C. R.: Berkey, 18a; Chamberlin (T C), 18b; Anon, 18c  
 Wachsmuth, Charles: Bather, 96a; Calvin, 97d; Keyes, 96d, n, 97d  
 Walcott, C. D.: Anon, 98  
 Ward, H. A.: Farrington, 06d  
 Ward, L. F.: Hollick, 13  
 Weston, T. C.: Bell (R), 11



## Biography—Continued.

- White, C. A.: Benjamin, 10; Dall, 11b; Keyes, 14i  
 White, David: Anon, 12c  
 White, T. G.: Kemp, 02d, 03d; Ries, 01b  
 Whiteaves, J. F.: Schuchert, 09a; Anon, 06a  
 Whitfield, R. P.: Clarke (J M), 11f; Gratacap, 10, 11; Hovey, 10e  
 Whitney, J. D.: Brewster, 09  
 Whittlesey, Charles: Baldwin, 87; Winchell (A), 89f  
 Williams, G. H.: Clark (W B), 95; Clarke (J M), 95; Iddings, 94a; Williams (T), 96  
 Williams, H. S.: Schuchert, 18e; Weller, 18  
 Williams, J. F.: Kemp, 92, 92a; Anon, 91  
 Williston, S. W.: Brown (B), 18; Osborn, 18a  
 Willmott, A. B.: Coleman, 16a  
 Winchell, Alexander: Winchell (N H), 91c, 92a, c  
 Winchell, N. H.: Bain, 16a; Clarke (J M), 14a; Schuchert, 14d; Upham, 15a, 16  
 Wing, Augustus: Seely, 01a  
 Worthen, A. H.: Bliss (N W), 90; Ulrich, 88b; White (C A), 95a  
 Wright, A. A.: Wilder, 07; Wright (G F), 05a  
 Wright, C. D.: Lawton, 88  
 Yeates, W. S.: McCallie, 09; Merrill (G P), 10
- Biology, geological: Williams (H S), 95  
 Biopalla: Wallace (S J), 78  
 Biped tracks, Nevada: Cope, 83q  
 Bird Mountain, Vt.: Dale, 00  
 Birds. *See* Aves.  
 Birmingham district, Ala.: Burchard, 10c; Butts, 07, 07b; Clinton ores: Burchard, 07  
 Birmingham folio, Ala. (no. 175): Butts, 10a  
 Bisbee district, Ariz.: Notman, 13; Ransome, 04, 04c, 13; Tovote, 11  
 Bisbee folio, Ariz. (no. 122): Ransome, 04b  
 Bishop conglomerate, Wyo.: Rich, 10  
 Bismarck folio N. Dak. (no. 181): Leonard, 12  
 Bismuth.  
   General: U S G S, 83  
   Mexico, Guanajuato: Wittich (E), 10j  
   Quebec, northwestern: Bancroft (J A), 12a
- Bison occidentalis: Moodie, 09  
 Bitumen and oil rocks: Broadhead, 04  
 Bitumens. *See also* Asphalt.  
   Accumulation: Cooper (A S), 99a  
   Classification: Blake (W P), 90b  
   General: Blake (W P), 90b; Hunt, 63; Peckham, 95a; Sadtler, 95  
   Geologic occurrence: Peckham, 84  
   Missouri: Broadhead, 75b, 04  
   Native: Crosby, 79c  
   Origin: Anderson (F M), 04; Morgan, 04a, b; Peckham, 69, 84a, 94, 98  
   in fossillegg: Morgan, 04a  
   in stratified rocks: Whittlesey, 53a  
   Utah, Green River: Hayes (A A), 66
- Bituminization of wood: Carpenter (W M), 39a  
 Bituminous rocks. *See also* Oil shale.  
   Alberta, northern: Ells (S C), 14, 14a, 16, 17, 17a  
   California, San Luis Obispo: Fairbanks, 98b; Santa Barbara Co.: Cooper (A S), 98  
   Eastern United States: Ashley, 17

## Bituminous rocks—Continued.

- General: Broadhead, 04; Hovey, 04n; Hunt, 63; Taff 07b  
 Kentucky: Burk, 03; Morris (M), 97  
 Ohio, Greenfield: Napper, 16  
 Origin and distribution: Eldridge, 03  
 Origin of carbonaceous matter: Newberry, 83a  
 United States: Eldridge, 01, 01a
- Bivalves. *See* Pelecypoda.  
 Black Hills. *See* South Dakota; Wyoming.  
 Black sands.  
   Alaska, Yakutat Bay: Stanley-Brown, 91a  
   British Columbia, Vancouver Island: Brewer, 01a  
   California: Day (D T), 07; Edman, 94, 07; Silliman (jr), 73  
   Feather River: Sperry, 12  
   Pacific coast: Day (D T), 07a; Lang, 16  
   General: Day (D T), 05, 06; Hunt, 70f, 71i; Nicol, 04; Townsend, 08  
   Oregon: Day (D T), 05
- Black shale, formation: Schuchert, 15b; Twenhofel, 15  
 Black shale problem: Grabau, 15c  
 Black Mesa coal field, Ariz.: Campbell (M R), 11c  
 Black Mountain coal district, Ky.: Dilworth, 12  
 Black Mountains, Ariz.: Schrader, 08a, 09  
 Black Range district, N. Mex.: Fishback, 10; Wright (J W), 09  
 Black River section, Mich.: Gordon (W C), 05, 07  
 Black Sturgeon region, Ont.: Coleman, 09a  
 Blacktail (Tabby) Mountain coal field, Wasatch Co., Utah: Lupton, 12a  
 Blake, W. P., biography: Raymond (R W), 10, 11; Anon, 10b
- Blastoidea.  
   Blastoidocrinus: Hudson, 07a, b  
   Burlington fauna, Mo.: Rowley, 00b  
   Classification: Hambach, 11  
   Codaster: Wachsmuth, 83a  
   Devonian, Wis.: Weller, 98a  
   Eleutherocrinus, Ky.: Shumard (B F), 56  
   General: Meek, 74a; Roemer, 51; Wachsmuth, 84a  
   Hamilton group, Mich.: Barris, 83  
   Heteroschisma: Wachsmuth, 83a, 84a  
   Iowa, Devonian: Barris, 84; Kinderhook beds: Wachsmuth, 90  
   Kentucky, Mississippian: Lyon, 60c  
   Michigan, Devonian: Barris, 84  
   Mississippian: Keyes, 89e; Meek, 69b; Iowa Owen (D D), 52b  
   Missouri, Carboniferous: Rowley, 00, 01; Mississippian: Rowley, 93b  
   Montana, southwestern, Carboniferous: Clark (T H), 17  
   Morphology: Wachsmuth, 87  
   New York, Devonian: Hall, 62c  
   Nucleocrinus, Widder, Ont.: Montgomery (H), 81  
   Paleozoic, Mississippi Valley: Shumard (B F), 58c  
   Pelmatozoa from Chazy of New York: Hudson, 07, 11  
   Pentremite, new American: Schuchert, 06a



## Blastoidea—Continued.

Pentremites: Roemer, 51; Say, 19, 25; Shumard (B F), 58c; Wachsmuth, 83a; White (C A), 63; structure: Roemer, 48b, e; Yandell, 48; and classification: Hambach, 84

Pentremites conoideus: Smith (Essie A.), 06

Pentremites reinwardtii, Tenn.: Troost, 35a

Revision: Hambach, 03

Steganoblastus, external structure: Hudson, 17

Structure: Billings, 69a, b

Blastomeryx, osteology: Matthew (W D), 08d

Blewett mining district, Wash.: Weaver, 11

Block diagrams: Lobeck, 15

Block Island: Marsh, 96c; drift: Rand, 90

Blowing of soils: Reagan, 08b

Blowing wells. See Underground water.

Blue clay of Mississippian River: Little, 82

Blue Grass region, Ky.: Matson, 09

Blue Hills, Mass., petrology: Warren (C H), 13

Blue Mound quartzite: Hubbard (G D), 00

Blue Mountains, Oreg.: Lindgren, 01

Blue Ridge, Va.: Fontaine, 75; geologic structure:

Keith, 92a; origin: Davis (W M), 03f;

structure, near Harper's Ferry: Geiger, 91

Bluestone, Bodie district, Cal.: McLaughlin, 07

Bluffs of the Mississippi: Desor, 50f

Bog iron ore deposits, formation and distribution  
Dake, 15a

Bog lime, origin: Hale (D J), 03

Bogoslof Islands: Jordan, 06a; Smith (P S), 08a

Bogoslof Volcano: Jagger, 08c

Bohemia district, Oreg.: McDonald (D F), 09

Boisefolio, Idaho (no 45): Lindgren, 98

Bolosaurus: Broom, 13a; Case (E C), 07b

Bolson, development of: Meinzer, 12, 12b

Bolson plains: Keyes, 03a, 04a

Bolson region of Arizona: Tolman, 09a

Bolsons: Tolman, 15b

Bonaire.

General: Martin (K), 88

*Paleontology.*

Corals: Vaughan, 01

Bonanza district, Saguache Co., Colo.: Patton, 16

Bonneville (Lake): Gilbert, 82

Bonnifield region, Alaska: Capps, 11, 12; Prindle, 06b

Book Cliffs coal field, Utah: Richardson (G B), 09b; Taff, 06b

Bookkeeping, geological: Kemp, 05a

**Borax.**

Borate deposits: Wainwright, 09

California: Bailey (G E), 02; Keyes, 09f; Strong, 10; Wainwright, 09; Yale, 92, 04, 13, 16

Death Valley: Young (G J), 18

desert dry lakes: Bailey (G E), 04

Inyo Co.: Taft, 06a

Ryan, Lila C. mine: Gale, 12b

General: U S G S, 83; Wilson (E B), 09; Yale, 92, 04, 13, 16

Nevada, Silver Peak quadrangle: Spurr, 06b

Oregon: Stafford, 04

Origin and commercial value: Surr, 10c

Boremys: Lambe, 06c

**Borings.**

Alabama: McCalley, 91a; Fayette district: Munn, 11c

Alberta: Dawson (G M), 00; Fraser, 99; Huntley, 15a; Malcolm, 13; Slipper, 17

Athabasca Landing: Fraser, 95; Dawson (G M), 96

northern: Slipper, 16

southern: Dowling, 18

west central: Stewart (J S), 17

Arizona, northern: Darton, 10a; Sulphur Spring Valley: Douglas, 01

Arkansas, southwestern: Miser, 18a

Atlantic Coastal Plain: Darton, 95a

Bermuda Island: Pirsson, 13, 14a

California, Cat Canyon oil field: Smith (H D), 13

Death Valley: Gale, 14a

Kern River: Anderson (F M), 11

San Francisco: Irelan, 90b

Canada: Ingall, 09, 12, 15

Colorado, San Luis Valley: Siebenthal, 10

Connecticut, New Haven: Hubbard (O P), 89

Southbury: Hovey, 90

Deep wells: White (I C), 18; Pennsylvania and West Virginia: White (I C), 18b

Delaware: Matson, 13

Drill cores, specific weight: Lane 16b

Examination, methods of: Udden, 14

Florida, Key West: Hovey, 96; Lake Worth: Darton, 91c

Georgia: McCallie, 98

Illinois: Cady, 15; Kay (F H), 15; Leverett, 96; Savage, 13c; Udden, 14; Udden (Jon A), 09; Worthen, 83, 90a

Birds quadrangle: Rich, 16

Bond, Macoupin, and Montgomery cos.: Blatchley (R S), 14

Canton and Avon quadrangles: Savage, 16

Careville field: Kay (F H), 12

Carlyle oil field: Shaw (E W), 12

Crawford and Lawrence cos.: Blatchley (R S), 13

Danville district: Kay, 15a

Delafield: Udden (Jon A), 07

Dixon: Tiffany, 90

Franklin Co.: Udden (Jon A), 10

La Salle: Cady, 12

Moline: Pratt (W H), 82b

Peoria quadrangle: Udden, 12

Plymouth field: Blatchley (R S), 14, 17

Rock Island: Udden, 96, 98b

Sangamon Co.: Crook, 12a

Saybrook: Anon, 88c

southern: Nickles, 95a

Vincennes quadrangle: Rich, 16a

Indiana: Phinney, 91; Wright (F E), 16

natural gas wells: Gorby, 89a

Oakland City: Blatchley (R F), 11

Terre Haute: Guyot, 69

Iowa, Bedford: Kay, 14b

Burlington: Fultz, 99

Cedar Rapids: Norton, 95d

Centerville: Kay, 14

Davenport: Tiffany, 89

Emmetsburg: Winchell (N H), 80c

Glenwood: Call, 92



## Borings—Continued.

Iowa, Grinnell: Jones (A J), 95  
 Jackson Co.: Reid (H), 11  
 northeastern: Norton, 95a  
 Postville: Calvin, 96c  
 Sigourney, Keokuk Co.: Bain, 94b  
 southeastern: Gordon, 89  
 Washington: Calvin, 88a  
 Kansas: Haworth, 15; St. John, 85; Taylor (C H), 17  
 central: Perrine, 18  
 Chanute: Haworth, 02  
 Cherryvale: Bailey (E H S), 95  
 Elmdale: Smith (A J), 15  
 Emporia: Wooster, 88  
 Fort Scott: Bailey (E H S), 85  
 Kingman: Hay (R), 90c  
 Leavenworth: Hinds, 17; Jameson, 89  
 Madison: Bushong, 99  
 Russell: Parker (J D), 84  
 Topeka: Smyth (B B), 96  
 Valley Falls: Langworthy, 01  
 Wichita: Meade (J R), 98  
 Wyandotte: Case, 77  
 Kentucky: Hoeing, 13  
 Barboursville: McCallie, 03b  
 Louisville: Smith (J L), 59  
 Labrador: Wyman, 50b  
 Louisiana: Deussen, 18; Harris, 02b, c, 10  
 Belle Isle: Lucas (A F), 17  
 Caddo field: Hopper, 11  
 Lake Borgne: Forshey, 75; Hilgard, 78  
 New Orleans: Edwards (A M), 70d; Hilgard, 70, 70a  
 northwestern: Harris, 09b  
 southern: Harris, 05  
 McDonald oil well: White (I C), 97  
 Magnetic phenomena: Lane, 04a  
 Maine, southern: Bayley, 09a  
 Manitoba: Dawson (G M), 87b; Tyrrell, 92b;  
 Deloraine: Tyrrell, 93b  
 Maryland: Darton, 96d  
 Mexico, northeastern: White (I C), 13  
 Michigan: Lane, 02d, 05f, 09g; Smith (R A), 14  
 Cheboygan well: Alden, 09b  
 Detroit: Fay, 11; Fry, 13a  
 Lower Peninsula: Lane, 95  
 Manistee region: Fry, 13  
 Minnesota: Winchell (N H), 85e, 86  
 Belle Plaine salt well: Winchell (N H), 74b  
 East Minneapolis: Winchell (N H), 76a  
 Kittson Co.: Winchell (N H), 85c  
 Mesabi rocks: Winchell (N H), 09  
 Minneapolis: Winchell (N H), 82b, 85d  
 Minneopa: Hall (C W), 91a  
 Stillwater: Meeds, 91  
 Mississippi River: Hilgard, 84  
 Mississippi Valley, lower: Wilson (E H), 82  
 Missouri: McCoy, 13; Wheeler (H A), 10  
 Belton area: Wilson (M E), 18  
 Greene Co.: Shepard, 15  
 Jackson Co.: McCourt, 17  
 Kansas City: Thorne, 78, 79  
 Lebanon: Scherer, 05

28738°—24—4

## Borings—Continued.

Missouri: St. Louis: Broadhead, 75a; Litton, 57; Phillips (J V), 77; Anon, 53  
 National bureau of well-log statistics, need of: Matteson, 17  
 Nebraska: Hicks, 87  
 Brownville: Hicks, 85  
 Lincoln: Russell (B P), 88; Russell (F W), 88a  
 Nevada, Columbus Marsh: Gale, 14c  
 Lyon Co.: Anderson (R), 09b  
 Reno region: Anderson (R), 09a  
 Silver Peak Marsh: Dole, 13  
 Timber Lake: Gale, 13a  
 New Brunswick: Poole, 03  
 Queens Co.: Ells, 73; Newcastle Bridge: Ells, 76  
 Newfoundland, Grand Pond: Murray, 80  
 New Jersey: Darton, 96d; Disbrow, 27; Kimmel, 05a, 10; Woolman, 93, 96; Atlantic City: Woolman, 88, 90  
 New Mexico, Gallup Basin: Kirk, 14; northwestern: Darton, 10a  
 New York: Ashburner, 88; Darton, 96d  
 Alloway well: Prosser, 00d  
 Buffalo: Pohlman, 86a, 89  
 central: Prosser, 88  
 Erie Co.: Bishop, 97  
 Ithaca: Tarr, 04b  
 Long Island: Bryson, 88a, 89; Lewis (E), 89  
 Madison Co.: Prosser, 88a  
 Manhattan Island: Berkey, 09  
 Mohawk Valley: Prosser, 00c  
 Rochester: Fairchild, 91  
 southwestern: Harris, 91a  
 Staten Island: Camacho, 97; Hollick, 99e, 04a  
 Utica: Walcott, 88b  
 western central: Prosser, 90  
 North Carolina, Wilmington: Holmes, 00  
 North Dakota: Darton, 96e  
 Nova Scotia: Weatherbee, 04, 05  
 Ohio, Cincinnati, Ivorydale well: James (J F), 88b  
 Cleveland: Orton, 86d  
 Cleveland gas field: Rogers (G S), 17b  
 Columbus: Mather, 59; Columbus: Newberry, 61  
 Findlay: Condit, 13  
 northeastern: Bownocker, 05  
 Oxford: James (J F), 87a, b, 88f  
 southern: Stout, 16  
 Oklahoma: Aurin, 17, 17a; Shannon, 17; Wood (R H), 13  
 Bristow quadrangle: Fath, 17  
 Cushing field: Buttram, 14a  
 Ponca City field: Ohern, 12a  
 southern: Wegemann, 15a  
 Ontario: Brumell, 92; Knight (C W), 15a; Malcolm, 15  
 Petrolia field: Stansfield, 17  
 Port Colborne: McRae, 89  
 western: Ami, 99b  
 Pennsylvania: Carll, 77, 83  
 Armstrong Co.: Lesley, 73a  
 Bucks Co.: Lesley, 91a



## Borings—Continued.

- Pennsylvania: Carnegie quadrangle: Munn, 11a  
 Chester Co.: Lesley, 91b  
 Clarion Co.: Chance, 80b  
 Clarion quadrangle: Munn, 10a  
 Clearfield Co.: Hale (J M), 65  
 Clinton Co.: Chance, 78a  
 East Shamburg: Hall, 74  
 Elk Co.: Ashburner, 81  
 McDonald deep well: White (I C), 13a  
 McDonald oil field: Am G, 93; White (I C), 97, 18  
 McKean and Elk cos.: Ashburner, 79  
 petroleum regions: Lesley, 66, 77  
 Philadelphia region: Carter (O C S), 94a  
 Pittsburgh: Lesley, 76a  
 Potter Co.: Ashburner, 86  
 Scranton: Sheaffer, 69  
 Sewickley quadrangle: Munn, 10  
 southeastern: Carter (O C S), 91  
 Venango Co.: Nettleton, 77  
 West Elizabeth deep well: Watson, 11c  
 western: Lesley, 65a  
 Wilkes-Barre: Sheaffer, 70
- Prince Edward Island: Brock, 10a
- Quebec: Malcolm, 15
- Record, 1904: Fuller, 05
- Saskatchewan, Carlton: Ells, 77; Souris River valley: Selwyn, 81
- South Carolina, Charleston: Barbot, 85; Charleston (City), 82; Lynch (C N), 53; Lynch (P R), 53; Stephenson, 14a
- South Dakota: Darton, 96e, 09a; Shepard, 95; eastern: Darton, 97b
- Temperature measurement in bore holes: Johnston (J), 16b
- Tennessee: Munn, 11b  
 Glenmary, Scott Co.: Glenn (L C), 17  
 Memphis: Ashley, 11a; Munn, 12d  
 Warren Co.: Satterfield, 77
- Texas: Hill (R T), 98b; Udden, 12c  
 Austin: Shumard (B F), 59c  
 Coastal Plain: Deussen, 14  
 Galveston: Dumble, 93c; Hill (R T), 92c; Singley, 92, 93  
 northern: Shaw (E W), 16a  
 northwestern: Udden, 15a  
 Rustler Springs: Phillips (W B), 17  
 Spur: Udden, 14a  
 Thrall oil field: Udden, 16b  
 Wichita and Clay cos.: Udden, 12d
- United States: Darton, 02b, c, 05g
- Virginia: Darton, 96d; Fort Monroe: Fontaine, 82a; Rogers (W B), 82
- West Virginia: White (I C), 99, 04  
 Barbour Co.: Reger, 18  
 Boone Co.: Krebs, 15  
 Charleston quadrangle: Campbell (M R), 01  
 Clarksburg: White (I C), 18c  
 Huntington quadrangle: Campbell (M R), 00a  
 Kanawha Co.: White (I C), 14, 14a  
 Logan Co.: Hennen, 14a  
 Mingo Co.: Hennen, 14a  
 Morgantown: White (I C), 85c  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10

## Borings—Continued.

- West Virginia: Wheeling: Hallock, 91, 94  
 Wirt, Roan, and Calhoun cos.; Hennen, 11
- Wyoming, Byron field: Ziegler, 17  
 Converse and Carbon cos.; Jamison, 12  
 Oregon Basin field: Ziegler, 17a
- Boron: Wilson (E B), 09a
- Botany, fossil. *See* Paleobotany.
- Bothriolepis: Patten, 04, 05
- Botryocrinus: Bather, 06
- Bottineau gas field, N. Dak.: Barry, 08a
- Bottom currents: Kindle, 15b
- Boulder batholith, Mont.: Billingsley, 15; Knopf, 14c
- Boulder clay, Canada: Dawson (J W), 66b  
 composition: Crosby, 91a  
 Great Plains, origin: Dawson (G M), 97b  
 microscopic structure: Dawson (G M), 85a
- Boulder drift, Delaware: Chester (F D), 83
- Boulder oil field, Colo.: Washburne, 09a
- Boulder trains.  
 General: Chamberlin, 90a; Reed (S), 73  
 Massachusetts, Berkshire Co.: Benton, 78;  
 Desor, 47c; Hitchcock (E), 44c, 45a;  
 Perry, 71b; Reid (S), 45; Rogers (H D), 45a; Taylor (F B), 10b  
 eastern: Fuller, 98
- New York, Staten Island: Hollick, 15a
- Rhode Island, Iron Hill: Shaler, 93a
- Wisconsin, Waterloo quartzite: Buell, 95
- Boulders.  
 Analcite copper boulder, Keweenaw Range: Hovey, 93  
 Appalachian rivers: White (I C), 87  
 Brine corrosion: Wallace (R C), 17b  
 Carboniferous: Gresley, 90; Marsh, 72s; Taff, 05e, 09b; Winchell (A), 71c; White (C A), 71  
 Coal beds: Hicks, 79; White (D), 15b; Ohio: Orton, 92; Tennessee, McCallie, 03  
 Connecticut, Woodbridge: Hubbard (O P), 87  
 Missouri, decomposition boulders: Spencer (J W), 87c  
 Flattening by solution: Udden, 14b  
 Formation: Hanks, 93; Spencer (J W), 85a;  
*in situ*: Barton, 92; Tenney, 73b  
 Fractured, in conglomerate: Campbell (M R), 06a  
 Glacial: Wells, 92; distribution: Honeyman, 85e  
 Gneiss matrix: Leeds, 70  
 Gravel deposits: Rich, 14b  
 Indiana, Montgomery Co.: McBeth, 00a  
 Iowa, red quartzite: White (C A), 69c  
 Maine, Bethel, grooved: True (N T), 62  
 Massachusetts, Berkshire Co.: Rogers (H D), 45a  
 Lynn: Tracy, 69  
 Rockport: Saville, 90  
 Salem-Danvers region: Pickering, 54  
 New Hampshire, Madison: Crosby, 90b  
 New Jersey, Englewood: Dwight, 66  
 New York, drift: Brigham, 95  
 Ithaca region: Von Engeln, 18  
 Long Island: Bryson, 95a  
 Staten Island boulder trail: Hollick, 15a



## Boulders—Continued.

- Ohio, Cuyahoga Co.: Claassen, 98  
 glacial: Lapham, 32; Wright (G F), 94a  
 Warren Co.: Scoville, 78  
 Ontario, Toronto: Hinde, 78  
 Pennsylvania: Brigham, 95  
 Philadelphia: Martin (D S), 87  
 Pittsburgh: Gresley, 96a  
 Produced by rock decay: Upham, 04a  
 Scoured boulders, Mattawa Valley, Ont.:  
 Taylor (F B), 97f  
 Striated boulder, Amherst, Mass.: Hitchcock  
 (E), 56a  
 Transportation: Agassiz (L), 72a; to higher  
 levels: Reed (S), 73  
 Boundary Creek district, B. C.: Brock, 02, 03;  
 LeRoy, 12, 13a; Rickard (F), 07  
 Bouvé, T. T., biography: Crosby, 96a  
 Bowling Green limestone: Savage, 14a  
 Bowman, Amos, biography: Ami, 95b  
 Brachauchenius: Williston, 07  
 Brachiopoda.  
 Acrothele: White (C A), 81b  
 Acrothyra, Cape Breton: Matthew (G F), 01d  
 Acrothyra and Hyolithes compared: Matthew  
 (G F), 01  
 Arctic regions, Carboniferous: Whitfield, 08  
 Arkansas, Fayetteville shale fossils: Girty, 10a  
 Athyris: Billings, 67; Hall, 62e  
 Atrypa: Whitfield, 67; crural processes: Gur-  
 ley (W F E), 78  
 Atrypa hemiplicata: Billings, 59g  
 Atrypa reticularis: Thomas (A O), 16  
 Aviculipecten, type: Girty, 04d  
 Bibliography: Schuchert, 97  
 Billingsia: Ford (S W), 86a, b  
 Bilobites: Beecher, 91a  
 Brachia, morphology: Beecher, 97b  
 Brachial apparatus: Williams (H S), 93e  
 British Columbia, Mount Stephen: Matthew  
 (G F), 02b; Ordovician: Walcott, 10  
 Camarophorella: Hyde, 08a  
 Cambrian: Burling, 14a; Matthew (G F), 02b;  
 Walcott, 97a, 98a, 01, 02b, 05, 08a, 12  
 Alberta: Walcott, 10  
 St. John, N. B.: Matthew (G F), 95f  
 Canada, Ordovician: Billings, 59b  
 Caney shale fauna, Oklahoma: Girty, 09b  
 Carboniferous: Girty, 04b; McChesney, 59  
 Centronella: Billings, 63  
 Charionella: Billings, 61c  
 Chazy: Raymond (P E), 11  
 Chonetes: Norwood, 55a  
 Chonetes granulifer, development: Greene  
 (F C), 08a  
 Cincinnati: Foerste, 09c; James (U P), 74c;  
 Miller (S A), 75; and Mohawkian:  
 Foerste, 12a  
 Classification: Chapman (E J), 58; Crane  
 (Agnes), 93a; Schuchert, 93; of spire-  
 bearing: Schuchert, 94  
 Classification and terminology: Walcott, 08a  
 Colorado, Ouray fauna: Girty, 00  
 Coloration: Greger, 14  
 Composition of shell: Clarke (F W), 15b  
 Conotreta, Trenton Falls: Walcott, 90d

## Brachiopoda—Continued.

- Cretaceous: Gabb, 61a; New Jersey: Clark (W  
 B), 95c  
 Cryptonella and other genera: Hall, 63a  
 Cyrtina, Walpole, Ontario: Billings, 63e  
 Dalmanellas of the Chemung: Williams (H S),  
 08  
 Derbya multistriata, development of: Greene  
 (F C), 08a  
 Descriptions: Owen (D D), 52a  
 New York: Hall, 97a  
 of genera: Hall, 59e  
 of genera and species: Hall, 60a  
 Development: Beecher, 91  
 Devonian: Clarke (J M), 07a; Raymond (P E),  
 04a  
 Canada: Billings, 59a  
 Ellesmere Land: Meyer, 13  
 Montana: Raymond (P E), 09  
 Ohio: Prosser, 12a  
 vertical range: Claypole, 85c  
 Wisconsin: Cleland, 11  
 Dielasma, brachial supports: Beecher, 93f  
 Elkania: Ford (S W), 86b  
 Eodevonaria, new subgenus of Chonetes: Bre-  
 ger, 06  
 Eunoa: Clarke (J M), 02f  
 General: Beecher, 88a; Dall, 71; Hall, 44b,  
 67a, c, 73d, 89, 90, 94b, c; Nicholson, 75l;  
 Schuchert, 95b, 97  
 Generic characters and distribution: Rolfe, 89  
 Generic names: Dall, 77  
 Glossina: Cockerell, 11g  
 Greenland, Carboniferous: Grönwall, 17  
 Guadalupian fauna: Girty, 08  
 Hamilton: Hall, 60b; Missouri: Rowley, 94  
 Handbook: Hall, 92a, 94c  
 Index fossils: Grabau, 06a  
 Indiana, Cincinnati series: Cumings, 08  
 Richmond: Dennis, 99a  
 Salem limestone: Beede, 06  
 Iowa: Webster, 88d  
 Independence shale: Calvin, 78  
 Burlington: White (C A), 60  
 Jurassic, Mexico: Castillo, 95  
 Kentucky, Silurian: Foerste, 06; and Devon-  
 ian: Nettleroth, 89  
 Keokuk: Gordon (C H), 90  
 Koninckina: Beecher, 90a  
 Leptaenidae: Hall, 50b  
 Leptaenisca: Beecher, 90b  
 Leptocoelia: Hall, 63b; Rominger, 63  
 Leptocoelia concava, loop: Rominger, 63a  
 Lingula, Murray Bay, Quebec: Billings, 61;  
 Trenton: Whitfield, 80c; with cast of  
 peduncle: Walcott, 89b  
 Lingulae, composition: Logan, 54a  
 Lingulasma, Lingula and Trematis: Ulrich, 89b  
 Lingulella, Mine LaMotte, Mo.: Meek, 71g;  
 New York: Ford (S W), 78a  
 Lingulepis: Walcott, 97b  
 Lingulidae: Dall, 70  
 Lingulodiscina: Whitfield, 90b  
 Linnarssonina: Hall, 89c; Cambrian: Walcott,  
 85  
 Lissopleura, Lower Helderberg: Whitfield, 9c  
 Loop-bearing, revision: Beecher, 95c



## Brachiopoda—Continued.

- Maine, Silurian: Williams (H S), 13a  
 Manitoba, Devonian: Whiteaves, 91a; Saskatchewan River valley: Kindle, 15a  
 Maryland, Devonian: Clarke (J M), 13e; Prosser, 13c; Schuchert, 13c  
 Minnesota, Ordovician: Winchell (N H), 80b, 81a  
 Mississippian: Greger, 10; Worthen, 60  
 Mississippi Valley: Weller (S), 14  
 Ohio: Prosser, 12a  
 Mississippian loop-bearing genera: Weller, 11a  
 Mississippian rhynchonelliform shells, internal characters of: Weller, 10  
 Missouri: Keyes, 94d; Shumard (B F), 55  
 Carboniferous and Devonian: Swallow, 60  
 Mississippian: Rowley, 93b, 02  
 Montana, Devonian: Haynes, 16  
 southwestern, Carboniferous: Clark (T H), 17  
 Newberria: Hall, 91c  
 New Jersey, Cretaceous and Tertiary: Whitfield, 85; Miocene: Whitfield, 94  
 New York, Devonian: Hall, 63, 67  
 Silurian: Beecher, 89  
 Tropicidoleptus fauna, Canandaigua Lake: Raymond (P E), 04  
 Nomenclature of certain genera: Buckman, 06  
 Nomenclature of shells: Billings, 56f  
 Nova Scotia, Carboniferous: Davidson (T), 63  
 Nucleospira: Hall, 59d  
 Obolella: Ford (S W), 81  
 Obolella chromatica, structure: Billings, 76  
 Obolellina: Billings, 72, 72d; nomenclature: Billings, 72a  
 Oboloid shells, Cambrian: Matthew (G F), 02b  
 Obolus, Black Hills: Whitfield, 75  
 Ohio, Kelly's Island, Spirifer: Klippart, 74; Maxville limestone fauna: Morse, 11  
 Ohio Valley: Shaler, 76  
 Old age characters: Shimer, 06  
 Ontogeny and phylogeny: Beecher, 93  
 Orbiculoidea, New York: Dwight, 80  
 Ordovician: James (J F), 96a  
 distribution in Arnheim and Waynesville: Foerste, 05a  
 Galena and Maquoketa: Sardeson, 96  
 Minnesota: Winchell (N H), 92d, 95c  
 Ontario: Billings, 56j  
 Orthidae: Hall, 91d  
 Orthis, structure of shell: Hall, 83e; subdivision of: Hall, 90b  
 Orthis insculpta, Oxford, Ohio: Christy, 58  
 Orthothetes, Salem limestone, Indiana: Cumings, 01a  
 Orthothetes minutus, development: Cumings 01d  
 Oxoplecia, Utica of Ontario: Wilson (A E), 13  
 Palæoglossina: Cockerell, 11g  
 Paleogeographic significance: Schuchert, 11  
 Paleozoic: Billings, 71a; Hall, 57, 59e, 63l; Sharpe, 48; evolution: Crane (A), 93; list of species: Schuchert, 90a  
 Paleozoic genera: Clarke (J M), 89; Hall, 91a, 93  
 Paraphorhynchus: Weller (S), 05b  
 Parastrophia hemiplicata, plications: Wilson (A E), 14

## Brachiopoda—Continued.

- Park City formation phosphate beds fauna: Girty, 10  
 Pennsylvania, Allegheny and Conemaugh faunas: Raymond (P E), 10c; Perry Co.: Rafinesque, 39a  
 Pentamerus, Indiana: Conrad, 55d; Silurian, Manitoba: Calvin, 92a  
 Persistence of fluctuating variations as illustrated by Rhipidomella: Williams (H S), 10c  
 Phylogeny: Williams (H S), 93e  
 Platystrophia, morphogenesis: Cumings, 03; morphological variations: McEwan, 17  
 Platystrophia lynx, variation: Cumings, 02  
 Poikilosakos, Carboniferous, Young Co., Tex.: Watson (D M S), 17  
 Productus: Norwood, 55; Trowbridge, 82; St. Louis: Prout, 57  
 Productus giganteus, California: White (C A), 81a  
 Ptychospira: Greger, 04  
 Quebec, Anticosti: Shaler, 65  
 Magdalen Islands: Beede, 11  
 Rensselaeria, Hamilton group, Pennsylvania: Claypole, 83f  
 Rensselaeria mainensis, Devonian, Maine: Williams (H S), 07  
 Rensselaerina, Linden shale, Tennessee: Dunbar, 17  
 Reticularia laevis: Kindle, 06  
 Rhipidomella: Williams (H S), 10c  
 Rhynchopora: Greger, 04a  
 Rhynobolus: Hall, 72c  
 Richmond group: Foerste, 09e  
 Richthofenia, affinities: Marcou (J B), 83a; Texas, Permian: Böse, 16  
 Schuchertella from Migouasha, Gaspé: Clarke (J M), 11a  
 Sedimentary relations: Burling, 14a  
 Seminole argentia, spiralia, variation: Beede, 02a  
 Shell structure, Paleozoic: Hall, 83n  
 Silurian, Canada: Billings, 59a  
 development: Beecher, 89  
 Indiana, Ohio, and Kentucky: Foerste, 09  
 Ontario: Billings, 56g  
 Siphonotreta, Utica formation, Ottawa: Whiteaves, 82  
 Siphonotreta (Protosiphon), Cambrian: Matthew (G F), 97d  
 Siphonotreta scotica, Ontario: Ami, 87b  
 Skenidium, Silurian, Missouri: Rowley, 04  
 Spire-bearing genera: Schuchert, 94a  
 Spirifer: Swallow, 66b; evolution: Grabau, 05b, 07  
 Silurian, Maine: Williams (H S), 16a  
 Spirifer cameratus: Beede, 98d  
 Spirifer cuspidatus: Meek, 65k  
 Spirifer laevis: Williams (H S), 80; Portage group: Williams (H S), 81  
 Spirifer mucronatus, mutations: Grabau, 12d, 13h; variation: Mook, 15a  
 Spirifer urbana, Hamilton group: Calvin, 88f  
 Spirifera: Hall, 66a, 90c; Devonian: Calvin, 92b; Williams (H S), 84c  
 Spirifera atwaterana: Miller (S A), 80g



**Brachiopoda—Continued.**

- Spirifera parryana: Calvin, 88e  
 Spiriferoids, Lake Minnewanka section, Alberta: Shimer, 13  
 Streptorhynchus: Hall, 63c  
 Stricklandinia: Billings, 68a, f, '74; Catoosa Co., Ga.: White (C A), 81d  
 Strophalosia: Beecher, 90c  
 Strophomena: Miller (S A), 97a; Richmond group: Nickles, 03  
 Strophomenidae: Williams (H S), 87b  
 Sutton Jurassic of Vancouver Island, B. C.: Clapp (C H), 11a  
 Syringopleura Schuchert: Girty, 11a  
 Syringothyris: North, 13; Schuchert, 90; punctate shell structure: Meek, 67d  
 Missouri Devonian: Schuchert, 10c  
 Tennessee, Indiana, and Kentucky: Foerste, 09b  
 Terebratula, Cretaceous, Black Hills: Whitfield, 75; New Jersey: Morton, 29c  
 Terebratula mormonii: Marcou, 75a  
 Terebratulidae: Dall, 70  
 Tertiary, Washington: Weaver, 12a  
 Texas, Potsdam sandstone: Shumard (B F), 60c  
 Trematis: Hall, 73c  
 Trematobolus: Matthew (G F), 93c  
 Triassic, marine: Smith (J P), 14  
 Trimerella: Billings, 71  
 Keewatin: Whiteaves, 02a  
 Ohio: Meek, 71a  
 Trimerellidae: Davidson, 74  
 Trinidad, Tertiary: Guppy, 66a  
 Zygospira: Hall, 62d; brachial supports Beecher, 93f  
 Zygospira recurvirostra, development of shell: Schuchert, 93a
- Brachiosaurus:** Riggs, 03a  
**Brachyostracon:** Brown (B), 12, 12c.  
**Bradshaw Mountains folio, Ariz. (no. 126):** Jaggar, 05  
**Bragdon formation, Cal.:** Diller, 05c; Hershey, 04  
**Brandon lignite, Vt.:** Jeffrey, 06a; Perkins (G H), 06, 06a  
**Brandywine formation, Atlantic Coastal Plain:** Clark (W B), 15a  
**Bras d'Or lakes, shore development:** Woodman, 99a  
**Brazil limestone fauna:** Greene (F C), 11  
**Breathing wells.** *See* Underground water.  
**Breccia.** *See also* Rock structures.  
 Classification: Norton, 17  
 General: Wallace (J P), 00  
 Intracformational breccias, origin and classification: Field, 16  
 Limestone breccias, origin: Campbell (M R), 08  
 Mariposa formation, Colfax, Cal.: Moody, 17  
 Quebec, near Montreal: Harvie, 10; St. Helen's Island: Nolan, 03  
 St. Louis limestone, origin: Morse, 16; Van Tuyl, 16, 16g  
**Breckenridge district, Colo.:** Ransome, 11  
**Bremen oil field, Ohio:** Bownocker, 10  
**Bremner River district, Alaska:** Moffit, 12a  
**Brewer, W. H., biography:** Jenkins, 11  
**Brewster iron district, N. Y.:** Koeberlin, 09

- Briceville folio, Tenn. (no. 33):** Keith, 96b  
**Bridger coal field, Wyo.:** Washburne, 09  
**Bridger group, Wyo.:** Sinclair, 06a  
**Brine.** *See also* Salt.  
 Diffusion in Appalachian oil field waters: Richardson (G B), 17b  
 Oil fields, origin of brines: Reeves, 17a  
**Bristol folio, Va.-Tenn. (no. 59):** Campbell (M R), 99a  
**British Columbia.**  
 Beaverdell district: Reinecke, 11, 12  
 Bibliography of geology and mining industry Gwillim, 08  
 Bulkley Valley: Leach (W W), 08, 09  
 Cascade region: Evans (H F), 06a  
 Climatic changes: Brock, 10  
 Coast: Blake (T A) 69; Graham (R P D), 09a; from Powell River to Kingcome Inlet: Bancroft (J A), 08  
 Coast Range: Porter 13  
 Comox and Suquash coal fields, Vancouver Island: Clapp (C H), 12b  
 Cranbrook sheet, East Kootenay: Schofield, 11  
 Deutschman's cave, near Banff: Ayres, 07-07b  
 Eastern B. C.: McEvoy, 99  
 East Kootenay: Schofield, 10, 12, 12a  
 Field area, Yoho Park: Allan, 12, 14  
 Finlay and Omenica rivers, northern B. C.: McConnell, 94, 96  
 Flathead area: MacKenzie, 15a  
 Franklin mining camp, West Kootenay: Drysdale, 12  
 Fraser Canyon: Camsell, 12  
 Fraser River region: Dawson (G M), 77b; reconnaissance: Malloch, 10  
 General: Burwash, 14b; Hector, 61  
 Graham Island, Queen Charlotte group: Clapp (C H), 14a  
 Hedley mining district: Camsell, 10a  
 Highland Valley: Evans (H F), 05c  
 Human skeleton in silt at Savona: Moncton, 13  
 Interior plateau: Evans (H F), 05f  
 International boundary, field operations: Daly, 07a  
 Iron River district: Allan, 11  
 Kamloops: Evans (H F), 05e  
 Kootenay district: Schofield, 16  
 Lardeau district: Brock, 08a  
 Lillooet mining division, Yale district: Camsell, 12a  
 Lillooet-Chilko Lake: Bateman, 14  
 Mount Robson: Coleman, 10b  
 Nakimu caves: Wheeler (A O), 07  
 Northern B. C.: Dawson (G M), 80a, 81a, 88  
 Observatory Inlet: McConnell, 12  
 Peace River country: Dawson (G M), 80a; Macoun, 74  
 Portland Canal district: Emmens, 10e; McConnell, 12b  
 Princess Royal Island: McConnell, 14b  
 Queen Charlotte Islands: Dawson (G M), 80b, 81f  
 Report of mining operations: Baker (J), 94; Carlyle, 97a; Robertson (W F), 99, 05  
 Rocky Mountains: McConnell, 93a; foothills: Cairnes, 06  
 Salmon River district: McConnell, 12a



## British Columbia—Continued.

Saltspring and Vancouver islands: Allan 10  
 Shuswap lakes region: Daly, 12; McEvoy, 93  
 Similkameen: Evans (H F), 06c  
 Siwash Creek area: Bateman, 12  
 Skagit Valley, Yale district: Camsell, 12b  
 Skeena River district: Leach, 10; Malloch, 12a  
 Slocan district: LeRoy, 10  
 Southern B. C.: Dawson (G M), 90a, 91  
 Southern interior: Dawson (G M), 89a  
 Stewart River region: Keele, 06  
 Stikine River district: Blake (W P), 64e  
 Telkwa River region: Leach, 07  
 Texada and Moresby islands: McConnell, 10a  
 Texada Island: McConnell, 09a, 14c  
 Tide pools, Vancouver Island: Henkel, 06  
 Tulameen district: Camsell, 10; Evans (H F), 06; diamonds: Camsell, 12c  
 Vancouver Island: Clapp (C H), 09, 10, 12, 12a; Sooke area: Cooke, 14a  
 West central B. C.: McEvoy, 94  
 West Fork of Kettle River: Evans (H F), 07b  
 West Kootenay district: Brock, 99, 00; Franklin mining camp: Drysdale, 12

*Economic geology.*

Ainsworth district: Schofield, 15a, 16a  
 Alberni mining district: Carlyle, 96  
 Anthracite, Groundhog field: Evans (G W), 13  
 Atlin district: Brock, 99; Cairnes, 11, 13; Gwillim, 00, 01; Stretch, 00a  
 Atlin gold fields: Atlin District Board of Trade, 13; Carmichael, 07  
 Atlin mining division: Brewer (W M), 15  
 Alunite, Vancouver Island: Clapp (C H), 14e; and pyrophyllite, Kyuquot Sound: Clapp (C H), 15  
 Bear River district: Emmens, 10e; Rush, 09; Thomson, 10  
 Beaverdell district: Reinecke, 10, 15  
 Blackwater: Brewer, 98  
 Boundary district: Austin, 98c; Brewer, 02c; Brock, 02, 02a, 03; Jacobs, 03; Keffer, 08; LeRoy, 13a; Rickard (F), 07  
     copper: Keffer, 07-07b; Stokes (R), 07  
     Emma mine: Keffer, 07b  
     Summit Camp: Parrish, 01  
 Bridge River area: Drysdale, 16, 17a  
 Building and ornamental stones: Parks (W A), 17, 17a  
 Bulkley Valley: Leach (W W), 09; coal: Leach (W W), 08  
 Caribou auriferous gravels: Jacobs, 11  
 Cariboo district: Bowman, 87, 87a  
 Cedar Canyon district: Burdsal, 96  
 Clay: Ries, 14c, d, 15; Pacific Great Eastern Railway: Camsell, 18b  
 Clay and shale deposits: Ries, 11, 11a, 12c, 13b  
 Clayburn, fire-clay deposits: Camsell, 13a  
 Coal: Brewer, 02a, f; Brown (R), 70; Budden, 84; Dawson (G M), 84; Denis, 06, 12; Dowling, 09, 15a; Gwillim, 05, 07; Harrington (B J), 73a; Hoffmann, 85; Merritt, 90; Ritter, 06b; Robertson (W F), 06a  
 Bear River field: Galloway, 12  
 Bulkley Valley: Leach (W W), 08, 09  
 Cascade basin: Dowling, 09a  
 Cassiar fields: Bell (J J), 07

## British Columbia—Continued.

*Economic geology—Continued.*

Coal: Comox and Suquash fields: Clapp (C H), 12b  
 Crowsnest field: Ashworth, 05; Blakemore, 01; Brewer, 02b; Corless, 01; Jacobs, 04; Leach, 02; McEvoy, 01a, 04; Rose, 18  
 Elk River basin: Dowling, 06; Rose, 17  
 Flathead area: Dowling, 14b; MacKenzie, 16a; Rose, 18  
 Galiano, Mayne, and Saturna islands: Clapp (C H), 14f  
 Graham Island: Blakemore, 04; Clapp (C H), 14a; Eells, 06, 06b; MacKenzie, 16b  
 Groundhog basin, Skeena district: Malloch, 12, 14  
 Kootanie: Penhallow, 92b  
 Nicola Valley field: Roberts, 10  
 Nicola-Coldwater: Evans (H F), 05  
 Peace River canyon: Galloway, 13  
 Queen Charlotte Islands: Clapp (C H), 13d; Dawson (G M), 80; Richardson (J), 73  
 Quilchena basin: Eells, 05  
 Rocky Mountains: Dowling, 06a  
 Similkameen district: Camsell, 07  
 Skeena River district: Leach, 07a, 10, 10a; Groundhog basin: Malloch, 12, 12a  
 Telkwa district: Leach, 06, 07  
 Tulameen district: Camsell, 10, 13  
 Vancouver Island: Clapp (C H), 10, 12, 13b, c; Ormiston, 93; Richardson (J), 72a, 73, 74, 78; Nanaimo area: Clapp (C H), 12c, 14; Selwyn, 75; Nanaimo-Comox: Poole, 06; southern Vancouver Island: Clapp (C H), 13c  
 Yale district: Camsell, 10b  
 Coast region: Bancroft (J A), 13; Moncton, 98  
 Columbia, upper, region: Brewer, 99e  
 Copper: Brewster, 05; Wilson (A W G), 12a  
 Aspen Grove and Aberdeen: Johnston (R A A), 05  
 Atlin district: Cairnes, 13  
 Boundary district: Brock, 02a, 03; Keffer, 07; 07a, b, 08; Ledoux, 02; LeRoy, 13a; Rickard (F), 07; Stokes (R), 07; Phoenix: LeRoy, 12  
 coast region: Bancroft (J A), 13  
 East Kootenay: Schofield, 10a  
 Eschelon Mountain: Evans (H F), 06b  
 Fraser River region: Malloch, 10  
 Granby Way: McConnell, 13  
 Highland Valley camp: Drysdale, 16  
 Indian River, Vancouver division: Camsell, 18, 18a  
 Kamloops: Wade, 98  
 Klehini Valley: Bryant (J W), 12  
 Lardeau district: Brock, 08a; Emmens, 10  
 Lynn Creek district: Emmens, 13  
 Mother Lode mine: Allen (R H), 09  
 Nelson area: LeRoy, 12a  
 New Westminster and Nanaimo districts. LeRoy, 08  
 New Westminster and Texada islands: LeRoy, 06  
 Nicola River region: Johnston (R A A), 06c  
 Osoyoos and Similkameen districts: Camsell, 09



## British Columbia—Continued.

*Economic geology—Continued.*

Copper: Phoenix district: Rickard, 17a; Granby Consolidated, copper: Allen (R H), 09a  
 Queen Charlotte Islands: McLellan, 10  
 Rossland district: Brock, 06; Stokes (R), 07e  
 Rossland mines: Allen (R H), 10  
 Saltspring and Vancouver islands: Allan, 10  
 Similkameen district: Bailey (F), 05; Camsell, 06a, 07; Keffer, 15; Scott (O N), 02  
 Slocan district: LeRoy, 09  
 Telkwa district: Dolmage, 18; Leach, 06  
 Texada and Moresby islands: McConnell, 10a  
 Texada Island: McConnell, 09a, 14; Marble Bay: LeRoy, 06, 07  
 Trout Lake district: Emmens, 10a  
 Tulameen district: Camsell, 10, 13  
 Vancouver Island: Brewer (W M), 00, 06; Clapp (C H), 09, 10, 12; Weed, 08; Mount Sicker: Musgrave, 04; southern Vancouver Island: Clapp (C H), 14b, d, 17; Tyee deposit: Dolmage, 16  
 Yale district: Camsell, 10b, 14a  
 Copper-gold-silver deposits, Vancouver and adjacent islands: Brewer, 17a  
 Cranbrook area: Schofield, 11, 15  
 Diatomaceous earth, clay, and magnesite, Pacific Great Eastern Railway: Camsell, 18b  
 East Kootenay district: Schofield, 10, 11, 12, 14; St. Eugene mine: Jacobs, 10; Windermere: Brewer, 99d  
 Epsomite lake: Jenkins, 18b  
 Field area: Allan, 14  
 Finlay and Omenica rivers: McConnell, 96  
 Fire clay deposits, Clayburn: Camsell, 13a  
 Flathead area: Rose, 18  
 Forty-ninth parallel: Bauerman, 85  
 Franklin mining camp, West Kootenay: Brock, 07a; Drysdale, 15  
 Fraser Canyon, Siwash Creek area: Bateman, 12  
 General: Baker (J), 94; Bowman, 87a; Brewer (W M), 02e; Carlyle, 97a; Dawson (G M), 77, 78b, 89; Hardman, 97; Robertson, 99, 05; Vicaire, 04  
 Gold: Bowman, 87b; Cairnes, 11b; Dawson (G M), 96a; Evans (H F), 07; Gwillim, 10; Hepburn, 15; Hobson, 95; Lincoln, 11a  
 Atlin district: Atlin District Board of Trade, 13; Cairnes, 11, 13; Carmichael, 07; Gwillim, 00a, 01, 02; Stretch, 00a  
 Barkerville: Atkin, 04, 06  
 Boundary district: Brock, 02a; Keffer, 07b  
 Bridge River camp, Lillooet district: Cirkel, 00  
 Cariboo district: Bowman, 88; Jacobs, 11  
 Cayoosh Creek: Moncton, 97  
 Columbia River: Nason, 96  
 East Kootenay: Schofield, 10a  
 Fairview district: Merritt, 99  
 Fraser Canyon, Siwash Creek area: Bateman, 12  
 Fraser River: Evans (H F), 05a; Malloch, 10  
 Hedley district: Camsell, 08, 10; Rickard, 17  
 Kamloops area: Dawson (G M), 95  
 Kettle River district: Reinecke, 10a  
 Lardeau district: Emmens, 10, 10b

## British Columbia—Continued.

*Economic geology—Continued.*

Gold: Lightning Creek: Atkin, 05  
 Lillooet division, Yale district: Camsell, 12a  
 Nelson area: LeRoy, 12a  
 New Westminster and Texada Island: LeRoy, 06  
 northern B. C.: Merritt, 98  
 Osoyoos and Similkameen districts: Camsell, 09  
 Portland Canal district: Emmens, 10e; McConnell, 11; Robertson (W F), 10; Thomson, 10  
 Prince Royal Island: McConnell, 14b  
 Queen Charlotte Islands: McLellan, 10  
 Rossland district: Allen (R H), 10; Brock, 06; Bruce, 17a; Stokes (R), 07e; Yuill, 08  
 Sheep Creek district: Gracey, 10  
 Similkameen district: Camsell, 06a, 07  
 Siwash Creek: Emmens, 11  
 Skagit Valley, Yale district: Camsell, 12b  
 Skeena River district: Leach, 07a, 10, 10a  
 Slocan district: Bancroft (M F), 18; Gwillim, 96; LeRoy, 09, 10  
 Texada and Morseby islands: McConnell, 10a  
 Texada Island: McConnell, 09a  
 Trail Creek district: Sword, 96  
 Trout Lake district: Emmens, 10a  
 Tulameen district: Camsell, 10, 10c, 13  
 Unuk River region: Wright (F E), 06  
 Vancouver Island: Clapp (C H), 09, 10, 12; Watson (R L), 01  
 Yale district: Camsell, 10b  
 Ymir camp, West Kootenay district: Drysdale, 17  
 Gold-bearing conglomerate: Ludloff, 99  
 Graham Island: Mackenzie, 14a, 15, 16b  
 Granby Bay: McConnell, 13  
 Grand Forks mining division: Larson, 15  
 Graphite, Cranbrook: De Schmid, 17  
 Groundhog coal basin, Skeena district: Malloch, 12, 12a  
 Harrison Lake: Brewer, 98a  
 Hazelton district: Malloch, 14a; O'Neill, 18  
 Hedley district: Camsell, 08, 08a, 10a; Nickel Plate mine: Rickard, 17  
 Highland Valley copper camp: Drysdale, 16  
 Howe Sound region: Brewer, 00b; Britannia ore deposit: McConnell, 14f  
 Hydromagnesite, Atlin: Young (G A), 16  
 Interior plateau: Robertson (W F), 06a  
 Iron: Brewer (W M), 02f; Leith, 06; Whittier, 17  
 Granby Bay: McConnell, 13  
 Kitchener: Blakemore, 02  
 Magnetite, on islands: Kimball, 97a  
 microstructure: Singewald, 13, 13b  
 New Westminster and Nanaimo districts: LeRoy, 08  
 Queen Charlotte Islands: McLellan, 10  
 Saltspring and Vancouver islands: Allan, 10  
 Texada Island: Brewer, 00d; Kimball, 97a; McConnell, 09a  
 Vancouver Island: Brewer, 00d; Clapp (C H), 10, 12  
 Vancouver and Texada islands: Brewer, 17; Lindeman, 08, 10, 11  
 Yale district: Camsell, 10b



## British Columbia—Continued.

*Economic geology*—Continued.

- Kamloops district, Similkameen: Brewer, 00, 00h; Dawson (G M), 95  
 Kamloops Lake region: Monckton, 99  
 Kettle River district: Reinecke, 10a; Larson, 15  
 Klehini Valley: Bryant (J W), 12  
 Kootenay district: Beadle, 96a; Ledoux, 91; zinc: Argall, 06  
 Kootenay Lake, district east of: Bancroft (M F) 16  
 Kootenay terranes: Drysdale, 17a  
 Lake region: Lakes, 15  
 Lardeau district: Brock, 04b, 05, 05a, 08a; Emmens, 10, 14  
 Lead, Bear River District: Rush, 09  
 Beaverdell district: Reinecke, 10  
 East Kootenay: Jacobs, 10; Schofield, 10a, 12, 12a  
 Lardeau district: Emmens, 10  
 Lynn Creek district: Emmens, 13.  
 St. Eugene mine: Stokes, 07d  
 Skeena River district: Leach, 10, 10a  
 Slocan district: Kendall, 99; LeRoy, 10  
 Trout Lake district: Emmens, 10a  
 Yale district: Camsell, 10b  
 Lardeau district: Emmens, 10  
 Lillooet district: Bateman, 14a; Brewer, 98c; Cadwallader Creek camp: Brewer, 01  
 Lynn Creek district: Emmens, 13  
 Magnetite deposits of Texada and Vancouver islands: Lindeman, 11  
 Magnesite, Bridge River district: Drysdale, 17a  
 Manganese, Slocan district: Bancroft (M F), 18  
 Mica, Big Bend district: De Schmid, 14; Tête Jaune Cache district: De Schmid, 14  
 Mineral production: Robertson (W F), 14  
 Mineral resources: Rose, 11; Vancouver Island, Brewer, 04a  
 Mining operations, reports: Baker (J), 94; Carlyle, 97a; Robertson (W F), 99, 05  
 Molybdenite: Evans (H F), 05d; Walker (T L), 11, 11a  
 Lillooet mining division: Drysdale, 17a  
 Lost Creek: Drysdale, 15c  
 Mother Lode mine: Allen (R H), 09  
 Mount Sicker district: Brewer (W M), 03b  
 Nanaimo area: Clapp (C H), 14  
 Natural gas: Denis, 06  
 Nelson district, west Kootenay: Emmens, 10c; LeRoy, 12a  
 New Westminster and Nanaimo districts: LeRoy (O E), 08  
 New Westminster district: Bowman (A), 89; Howe Sound: Brewer, 00g  
 New Westminster Island and Texada Island: LeRoy, 06  
 Nickeliferous sand, Frazer River: Blake (J), 73b  
 Nicola coal basin: Ells, 05  
 Northern B. C.: Dawson (G M), 80a  
 Northern interior: Camsell, 16a  
 North Thompson valley: Gwillim, 10  
 Observatory Inlet: McConnell, 12, 14e  
 Oil fields, prospective: Craig, 15  
 Oil possibilities, southwestern B. C.: Tyrrell, 15a

## British Columbia—Continued.

*Economic geology*—Continued.

- Omineca mining division: Brewer (W M), 15a, b; Galloway, 15; Babine Lake area: Emmens, 14a  
 Osoyoos and Similkameen districts: Camsell, 09  
 Osoyoos district, Camp Hedley: Camsell, 08, 08a; Phoenix, Rickard, 17a  
 Peace River canyon, coal measures: Galloway, 13  
 Peace River country: Dawson (G M), 80a  
 Pemberton Meadows: Brewer, 98  
 Petroleum: Denis, 06; southeastern B. C.: Willis, 01a  
 Phoenix, Boundary district: LeRoy, 12  
 Phoenix camp and Slocan district: LeRoy, 09  
 Platinum: Bailey (F), 13; Brock, 04a; Hoffman, 88; Tulameen district: Kemp, 02  
 Portland Canal district: Emmens, 10e; McConnell, 11, 12b, 13a; Robertson (W F), 10; Rush, 10; Thomson, 10  
 Princess Royal Island: McConnell, 14b  
 Pyrophyllite, Vancouver Island: Clapp (C H), 14e  
 Quadra Island: Cairnes, 14e  
 Queen Charlotte Islands: McLellan, 10  
 Quicksilver: Ingall, 97; Monckton, 04  
 Kamloops district: Colquhoun, 99  
 Yale district: Camsell, 10b  
 Rainy Hollow district: McConnell, 14d  
 Rossland district: Brewer, 98d, Brock, 06; Bruce, 17a; Campbell (C M), 02; Drysdale, 14a, 15a; King (C), 00a; Kirby, 04; MacDonald (B), 03; Stokes (R), 07e; Center Star mines: Allen (R H), 10  
 St. Eugene silver-lead mine: Stokes (R), 07d  
 Sandon district: Brewer, 98b  
 Scheelite, Barkerville: Atkin, 05a  
 Shale: Ries, 11, 15  
 Sheep Creek district: Gracey, 10  
 Shuswap area: Dawson (G M), 99a  
 Silver, Atlin district: Cairnes, 13  
 Bear River district: Rush, 09  
 Beaverdell district: Reinecke, 10  
 East Kootenay: Jacobs, 10; Schofield, 10a, 12, 12a  
 Kettle River district: Reinecke, 10a  
 Lardeau district: Emmens, 10  
 Lynn Creek district: Emmens, 13  
 Nelson district, west Kootenay: Emmens, 10c; LeRoy, 12a  
 New Westminster and Texada Islands: LeRoy, 06  
 Portland Canal district: Emmens, 10e; Thomson, 10  
 Rossland district: Brock, 06  
 St. Eugene mine: Stokes (R), 07d  
 Silvertown district: Vallance, 11  
 Skeena River district: Leach, 10, 10a  
 Slocan district: Gwillim, 96; Kendall, 99; LeRoy, 09, 10  
 Telkwa district: Dolmage, 18; Leach, 06  
 Trout Lake district: Emmens, 10a  
 Tulameen district: Camsell, 10  
 West Kootenay: Ingall, 95  
 Windy Arm region: McConnell, 06a, d  
 Yale district: Camsell, 10b



## British Columbia—Continued.

*Economic geology—Continued.*

- Silver-lead, Ainsworth district: Schofield, 16a  
 Cranbrook area: Schofield, 15  
 Slocan district: Uglow, 17  
 Similkameen district: Camsell, 06a, 07, 14b;  
     Evans (H F), 06d; asbestos: Camsell, 11;  
     Copper Mountain: Keffer, 15  
 Siwash Creek section: Emmens, 11  
 Skeena mining division: Brewer (W M), 15a;  
     McConnell, 13a  
 Skeena River district: Leach, 07a, 10, 10a  
 Slocan district: Bancroft (M F), 18; Drysdale,  
     17; Gwillim, 97; Kendall, 99; LeRoy, 10;  
     Uglow, 17  
 Southeastern B. C.: Beadle, 96; Corless, 02  
 Southern B. C.: Dawson (G M), 95b  
 Southern interior: Dawson (G M), 79, 89a  
 Squamish-Lillooet: Camsell, 18  
 Striped Mountain, Nickel Plate mines: Evans  
     (H F), 07d  
 Telkwa district: Dolmage, 18; Leach, 06, 07  
 Telkwa Valley: MacKenzie, 16  
 Texada Island: Brewer, 99b, 00a, c, 01b; LeRoy,  
     06; McConnell, 09a, 14; Marble Bay,  
     copper: LeRoy, 07  
 Thompson River Valley: Drysdale, 14  
 Trail Creek district: Austin, 98c; Carlyle, 96a  
 Trout Lake mining district: Emmens, 10a, d, 14  
 Tulameen district: Camsell, 10, 13; diamonds:  
     Camsell, 11, 11a; platinum: Camsell, 10c  
 Tungsten, Tulameen district: Camsell, 10c, 11,  
     11a  
 Unuk River region: Wright (F E), 04  
 Vancouver Island: Brewer, 98f, 99b, c, 00e, 01c;  
     Clapp (C H), 09, 10, 12; Richardson (J), 73  
 Alberni district: Brewer, 00c  
 auriferous black sands: Brewer, 01a; Watson  
     (R L), 01  
 Duncan area: Clapp (C H), 14d  
 Sicker district: Brewer, 00f: northern part:  
     Dawson (G M), 87  
 Sooke and Duncan areas: Clapp (C H), 17  
 Sooke area: Cooke, 14a  
 west coast: Brewer, 99a; Haycock, 03; Web-  
     ster, 03  
 West Kootenay district: Brewer, 98; Brock, 99a,  
     00, 00b, 01; Dawson (G M), 90; Gwillim,  
     98; McConnell, 95, 96a, 97, 98  
 Big Bend district: Nason, 97  
 economic minerals: Brock, 00a  
 Franklin mining camp: Drysdale, 12  
 Slocan, Nelson, and Ainsworth districts:  
     Carlyle, 97  
 Ymir area: Drysdale, 15b, 17; Fowler, 99  
 White Bear mine, Rossland: Yuill, 08  
 Windy Arm district: McConnell, 05b, 06a, 07;  
     Robertson (W F), 06b  
 Yale district: Camsell, 14a  
     Copper Mountain: Catherinet, 05  
     mineral resources: Camsell, 10b  
 Zinc: Barlow, 06; Can M B, 06  
     East Kootenay: Schofield, 10  
     Kootenay district: Argall, 06  
     Lardeau district: Emmens, 10  
     Lynn Creek district: Emmens, 13  
     Slocan district: LeRoy, 10

## British Columbia—Continued.

*Historical geology.*

- Adams Lake series: Evans (H F), 03a  
 Ainsworth district: Schofield, 16a  
 Atlin district: Cairnes, 11, 13; Gwillim, 00, 01, 02  
 Big Bend of the Columbia: Coleman, 90  
 Blackwater-Francois Lake region: Dawson  
     (G M), 78  
 Boundary Creek district: Brock, 02, 02a, 03;  
     LeRoy, 13a  
 Bridge River area: Drysdale, 16, 17a  
 Cambrian: Burling, 14; Walcott, 08a, 17; sedi-  
     mentation conditions: Burling, 15  
 Cambro-Ordovician boundary: Walcott, 10  
 Cariboo district: Bowman, 87, 88  
 Coal fields: Dowling, 15a; Leach, 13  
 Coast Range, columnar sections: Bowen (N L),  
     13; Lytton to Vancouver: Camsell, 13a  
 Coast region: Bancroft (J A), 13  
 Cordillera, forty-ninth parallel: Daly, 13a  
 Correlation of international strata: Evans (H F),  
     08a  
 Cranbrook area: Schofield, 15  
 Cretaceous: Dawson (G M), 89b, 90d; Ashcroft:  
     Evans (H F), 05b; lower: Whiteaves, 83  
 Crows Nest coal fields: Leach, 02; McEvoy, 01a;  
     Rose, 18  
 East Kootenay district: Schofield, 12b, 14;  
     geologic map: McEvoy, 01  
 Elko to Kootenay Lake: Schofield, 13  
 Elk Valley coal basin: Rose, 17  
 Field area, Yoho Park: Allan, 12, 14  
 Field region: Walcott, 11  
 Finlay and Omenica rivers, northern B. C.:  
     McConnell, 94, 96  
 Flathead area: MacKenzie, 16a; Rose, 18  
 Forty-ninth parallel: Bauerman, 85  
 Franklin mining camp, West Kootenay: Dry-  
     sdale, 15  
 Fraser River region: Bowen (N L), 14; Dawson,  
     (G M) 77b  
 Garibaldi volcanic area: Burwash, 14c  
 General: Burwash, 14b; Dawson (G M), 81b;  
     Hector, 63; Penhallow, 05b; Selwyn, 72b  
 Geologic map, southern interior: Dawson (G M),  
     77a  
 Golden-Banff: Allan, 14a  
 Golden-Kamloops: Daly (R A), 15  
 Graham Island: Ells, 06b; MacKenzie, 14a, 15,  
     16b, c; Queen Charlotte group: Clapp  
     (C H), 14a  
 Granby Bay: McConnell, 13  
 Groundhog coal field: Malloch, 14  
 Hazelton district: O'Neill, 18  
 Highland Valley copper camp: Drysdale, 16  
 Horsefly, Similkameen, and Tranquille beds:  
     Lambe, 06a  
 Ice River district: Allan, 12a  
 Interior plateaus, Savona to Lytton: Drysdale,  
     13  
 International boundary region: Daly, 02, 03b,  
     04, 05, 06d  
 Kamloops area: Dawson (G M), 95  
 Kicking Horse Valley: Walcott, 12b  
 Kootenay Lake, district east of: Bancroft  
     (M F), 16  
 Kootenay terranes: Drysdale, 17a



## British Columbia—Continued.

*Historical geology*—Continued.

- Lardeau district: Brock, 04b, 05  
 Leech River region: Dawson (G M), 78a  
 Lillooet area: Bateman, 14a  
 Lillooet-Chilko Lake: Bateman, 14  
 Mesozoic volcanic rocks: Dawson (G M), 77d  
 Mount Bosworth: Burling, 12a, 16a  
 Mount Stephen: McConnell, 89; Rominger, 88;  
     Woodward (H), 02; Cambrian: Walcott,  
     88a, 08; Winwood, 85  
 Moyie sills: Bailey, 13  
 Nanaimo group: Dawson (G M), 90d  
 Nanaimo sheet, Vancouver Island: Clapp  
     (C H), 12a  
 Nelson area: LeRoy, 12a  
 New Westminster and Nanaimo districts:  
     LeRoy, 08  
 New Westminster district: Bowman (A), 89  
 Nicola coal basin: Ells, 05  
 Northern B. C.: Dawson (G M), 81a, 88, 88b;  
     Selwyn, 77  
 Northern interior: Camsell, 16a  
 Peace River canyon, coal measures: Gallo-  
     way, 13  
 Peace River region: Dawson (G M), 81d  
 Phoenix, Boundary district: LeRoy, 12  
 Portland canal district: McConnell, 11, 13a  
 Pre-Cambrian formations: Daly, 12a; south-  
     eastern B. C.: Schofield, 14b  
 Prince Rupert-Aldermere: McConnell, 14a  
 Purcell Range: Schofield, 14a  
 Quadra Island: Cairnes, 14e  
 Queen Charlotte Islands: Dawson (G M), 80;  
     Richardson (J), 73; Whiteaves, 76; Meso-  
     zoic: Whiteaves, 85c  
 Queen Charlotte Sound and Burke Channel  
     geological map: Graham (R P D), 13  
 Quilchena coal basin: Ells, 05  
 Robson Peak district: Walcott, 10  
 Rocky Mountain region: Allan, 13; Burling, 16;  
     Dawson (G M), 86; McConnell, 87; geo-  
     logic history: Allan, 17  
 Ross lake section: Walcott, 17  
 Rossland, geologic map: Young (G A), 06a  
 Rossland district: Bruce, 17a; Campbell (C M),  
     02; Drysdale, 15a  
 Salmon River country: Fowler, 99  
 Savona area: Rose, 14  
 Selkirk and Purcell Mountains: Daly, 14a  
 Selkirk Mountains: Burwash, 11; Coleman, 11a  
     Dawson (G M), 91b; Walcott, 91b  
 Sherbrooke formation: Burling, 12a  
 Shuswap area, geologic map: Dawson (G M), 98  
 Shuswap lakes region: Daly, 12  
 Similkameen district: Camsell, 07, 13b; Copper  
     Mountain: Keffer, 15; Scott (O N), 02  
 Similkameen Valley, Striped Mountain: Evans  
     (H F), 08  
 Skeena mining district: McConnell, 13a  
 Skeena River district: Leach, 10; McConnell,  
     13; Malloch, 12a  
 Slokan district: Bancroft (M F), 18; Uglow, 17  
 Sooke and Duncan areas, Vancouver Island:  
     Clapp (C H), 17  
 Southeastern B. C.: Corless, 02  
 Southern B. C.: Dawson (G M), 95b

## British Columbia—Continued.

*Historical geology*—Continued.

- Southern interior: Dawson (G M), 79, 89a  
 Southwestern B. C.: Reagan, 07; Tyrrell, 15a  
 Squamish-Lillooet: Camsell, 18  
 Surface geology: Chalmers, 06a  
 Telkwa River district: Dolmage, 17, 18  
 Telkwa Valley: MacKenzie, 16  
 Texada Island: McConnell, 14  
 Thompson River valley: Drysdale, 14  
 Triassic: Dawson (G M), 83b; Whitney, 73b  
 Tulamenn district: Camsell, 13  
 Vancouver Island: Brewer, 04a; Burwash, 18;  
     Clapp (C H), 12, 13b; Hall (C W), 06;  
     Richardson (J), 72a, 74, 76, 78; Sutton, 04  
 adjacent coasts: Dawson (G M), 87  
 coal formation, age: Selwyn, 75  
 Cretaceous: Dawson (J W), 94c  
 Duncan area: Clapp (C H), 14d  
 geologic map: Clapp (C H), 12  
 Kyuquot Sound: Clapp (C H), 14e  
 Nanaimo coal district: Clapp (C H), 12c, 14  
 northern part: Dawson (G M), 87  
 Saanich area: Clapp (C H), 13e  
 Sicker series: Cooke (H C), 17  
 southeastern part: Bauerman, 60  
 southern part: Clapp (C H), 14b  
 Sutton Jurassic: Clapp (C H), 11a  
 Victoria area: Clapp (C H), 13e; Pleistocene  
     beaches: Newcombe, 14  
 west coast: Haycock, 03; Webster, 03  
 Victoria and Saanich quadrangles: Clapp (C H),  
     11  
 West central B. C.: McEvoy, 94  
 Western B. C.: Richardson (J), 76  
 West Kootenay and Boundary districts:  
     LeRoy, 13  
 West Kootenay district: Brock, 99, 99a, 01;  
     Dawson (G M), 90; McConnell, 95, 96a,  
     97, 98  
 Franklin mining camp: Drysdale, 12  
 geologic map: McConnell, 01a  
 Ymir area: Drysdale, 17; Fowler, 99  
 Whitemans Pass section: Drysdale, 18  
 Yale district: Camsell, 14a  
 Yellow Head Pass region: McEvoy, 00
- Mineralogy.*  
 Aphrosiderite: Larsen, 17a  
 Augite, titaniferous, Ice River: Warren, 17  
 Beaverdell area: Reinecke, 15  
 Cerusite: Thomson, 18a; Salmo: Ledoux, 18a  
 Chrompicotite, Lillooet district: Hoffmann, 02a  
 General: Brock, 15  
 Gold, native, from Queen Charlotte Islands:  
     Graham (R P D), 11  
 H. B. mine, Salmo: Walker, 18  
 Hedley mining district: Camsell, 10a  
 Hibbenite, Salmo: Phillips (A H), 16  
 Hopeite, Salmo: Walker (T L), 16  
 Ilvaite, Vancouver Island: Hoffmann, 91a  
 Meteorite, Beaver Creek, West Kootenai dis-  
     trict: Howell, 93b, 94  
 Natrolite, Ice Valley: Phillips (A H), 16a  
 Nephrite: Harrington, 91  
 Platinum: Hoffman, 88  
 Pyromorphite: Bowles, 09  
 Rossland: Bruce, 17a; Drysdale, 15a



## British Columbia—Continued.

*Mineralogy*—Continued.

- Souesite, Lillooet district: Hoffman, 05  
 Spencerite: Walker (T L), 16a; crystal form:  
 Walker (T L), 17; Salmo: Phillips (A H),  
 16  
 Tetrahedrite, West Kootanie district: Hoff-  
 man, 95  
 Tungstite and meymacite: Walker (T L), 08a  
 Vancouver Island, Sharp Point hot spring:  
 Clapp (C H), 14c

*Paleontology*.

- Albertella fauna, Mt. Bosworth: Burling,  
 14, 16c; Walcott, 17  
 Ammonites, Cretaceous, Queen Charlotte  
 Islands: Whiteaves, 93b  
 Amyzon brevipinne: Lambe, 06f  
 Bridge River district: Drysdale, 17a  
 Cambrian, annelids: Walcott, 10  
 fauna at Field: Walcott, 12c, 13a  
 Branchiopoda: Walcott, 10  
 Cephalopoda, Cretaceous: Whiteaves, 95d  
 Clallam formation fauna: Reagan, 10  
 Cranbrook area: Schofield, 15  
 Cretaceous: Whiteaves, 87a, 89b  
 Crustacea: Woodward (H), 00  
 lower: Whiteaves, 83  
 Cretaceous and Tertiary floras: Dawson (J W),  
 83a  
 Cretaceous flora: Ward, 05  
 Cyphornis: Cope, 95a  
 Drift fossils: Lamplugh, 86  
 East Kootenay district, Pleistocene flora:  
 Hollick, 14  
 Fishes: Cope, 94a  
 Flathead Valley Carboniferous: Salter, 85  
 General: Penhallow, 05b  
 Graptolites, Dease River: Lapworth, 88  
 Horsefly River, Tertiary Plantæ: Penhallow,  
 02a  
 Human remains, Savona: Drysdale, 16  
 Insects: Scudder, 79b; from Tertiary lake  
 deposits: Handlirsch, 10  
 Jurassic: White (C A), 85d; Coast Range:  
 Whiteaves, 78, 78a  
 Kettle River region, fossil plants: Penhallow,  
 07d  
 Kicking Horse Pass, graptolites: Lapworth, 87a  
 Kootenay Valley, Ficus: Hollick, 15; Pleisto-  
 cene: Humphreys (E W), 15  
 Lebeophyllum, Tertiary, Kettle River: Wilson  
 (W J), 13  
 Leuciscus rosei, Miocene: Hussakof, 16b  
 Loftusia: Dawson (G M), 79b  
 Lytoceras, Cretaceous, Denman Island: White-  
 aves, 01a  
 Merostomata, middle Cambrian: Walcott, 10  
 Mesozoic: Billings, 73  
 Mount Noyes: Woodward (H), 03  
 Mount Stephen, Cambrian: Matthew (G F),  
 99, 02b; Rominger, 87a, 88; Walcott,  
 88a, 89, 08; Winwood, 85; Woodward  
 (H), 02; Anomalocaris: Whiteaves, 92b  
 Mount Whyte fauna: Walcott, 17  
 Northern B. C.: Whiteaves, 77  
 Olenopsis from Cambrian: Walcott, 10  
 Ordovician: Walcott, 10

## British Columbia—Continued.

*Paleontology*—Continued.

- Oryctocephalus reynoldsi, Mount Stephen:  
 Reed (F R C), 99  
 Ovibos, tooth of, from Pleistocene near Mid-  
 way: Lambe, 07a  
 Paedemias, Lower Cambrian: Burling, 16b  
 Peace River country, Cretaceous plants: Daw-  
 son (J W), 81a  
 Plantæ: Dawson (J W), 91d; from inter-  
 national boundary survey: Penhallow,  
 07d  
 Queen Charlotte Islands: Whiteaves, 76, 84a, 00  
 Cretaceous invertebrates: Burwash, 14  
 Osmundites: Penhallow, 02  
 Queen Charlotte Islands and Vancouver Island,  
 Cretaceous Plantæ: Penhallow, 02a  
 Quesnel, Tertiary Insecta: Scudder, 77b, 78b  
 southern B. C., Tertiary plants: Dawson (J W),  
 79b  
 Stepheoceras from Nicola valley: Whiteaves, 09  
 Tertiary and Cretaceous plants: Penhallow, 06  
 Tertiary Hemiptera: Scudder, 95a  
 Tertiary plants: Penhallow, 08b; Vancouver  
 (city): Dawson (J W), 95b  
 Triassic: Whiteaves, 87a, 89a  
 Vancouver Island, Cretaceous: Meek, 61c, 64e,  
 76b; Shumard (B F), 58a; Whiteaves,  
 74, 79, 03  
 Crustacea, Cretaceous: Woodward (H), 95  
 Gastropoda, Tertiary: Merriam, 97a  
 Hemiaster, Cretaceous: Whiteaves, 04c  
 Nanaimo group: Whiteaves, 95c  
 Plantæ: Dawson (J W), 89b, 94c; Heer, 59,  
 65; Lesquereux, 59; Newberry, 63  
 Sooke fauna: Merriam, 99a  
 Sutton Jurassic: Clapp (C H), 11a  
 Tertiary: Merriam, 96a  
 Uintacrinus: Whiteaves, 04c  
 Unio, Cretaceous: Whiteaves, 01  
 Vancouver and Queen Charlotte islands, Crus-  
 tacea, Cretaceous: Woodward, 96  
 Woods, fossil: Dawson (J W), 73a
- Petrology.*  
 Beaverdell area: Reinecke, 15  
 Coast region: Bancroft (J A), 13  
 Cordillera, forty-ninth parallel: Daly, 13  
 Cranbrook area: Schofield, 15  
 Field area: Allan, 14  
 Garnet, altered from granite: Brock, 15a  
 General: Robertson, 99  
 Granite: Adams (F D), 91  
 Kamloops area: Ferrier, 95  
 Kettle River mining division: Silver, 03  
 Moyie sills: Bailey (P P), 13  
 Nepheline rocks, Ice River: Barlow, 02a  
 Northern B. C.: Adams (F D), 88  
 Okanagan composite batholith: Daly, 06a  
 Purcell sills, origin of granite: Schofield, 14a  
 Rocky Mountains: Bonney, 02a, 03, 03a  
 Rossland: Bruce, 17a; lamprophyres: Barber,  
 04  
 Sodalite syenite (ditroite), Ice River valley:  
 Bonney, 02  
 Sooke and Duncan areas, Vancouver Island:  
 Clapp (C H), 17  
 Tulameen district: Camsell, 13



## British Columbia—Continued.

*Petrology*—Continued.

- Vancouver Island: Burwash, 18; Clapp (C H), 12; Sicker series: Cooke (H C), 17  
 West Kootenay, Franklin mining camp: Drysdale, 15  
 Slocan district: Gwillim, 97  
 Ymir area: Drysdale, 17  
 West Kootenay and Boundary districts: LeRoy, 13

*Physical geology*.

- Changes in level of coast: Dawson (G M), 77c  
 Contact metamorphism of granite to garnet: Brock, 15a  
 Deformation of coast region: Clapp (C H), 15a  
 Glaciers: Ogilvie, 14; Palmer (H), 10; Rabot, 09; Vaux (G), 99, 00a, 01; Vaux (W S), 07 activity of: Sherzer, 08  
 Asulkan Glacier: Ries, 13a  
 Bute Inlet: Whympers, 68  
 Illecillewaet Glacier, Selkirk Mountain: Penck, 98; Vaux (G), 00  
 motion: Vaux, 11, 13  
 Selkirk and Rocky Mountains: Sherzer, 05, 06, 07  
 Selkirk Range: Green (W S), 89  
 Sir Sandford Glacier, 1911: Palmer (H), 12  
 variations: Vaux (G), 04, 06, 07, 07a, b, 08, 10  
 Yoho Glacier, motion: Wheeler (A O), 07a, 08 11, 13, 15, 15a, 17, 18  
 Pleistocene vulcanism, Coast Range: Burwash, 14a

Rocky Mountains, elevation: Dawson (G M) 95e

*Physiographic geology*.

- Alluvial fan near Field: Lahee, 08, 08a  
 Beaverdell area: Reinecke, 15a  
 Big Bend of the Columbia: Coleman, 90  
 Boundary Creek district: Brock, 03  
 Cheakamous region: Burwash, 14a  
 Cirques, Skeena basin: Keyes, 16f  
 Coast region: Bancroft (J A), 13  
 Contraposed shorelines: Clapp (C H) 13a  
 Cordillera, glacial geology: Dawson (G M), 90c  
 Epsomite Lake: Jenkins, 18b  
 Field area: Allan, 14  
 Franklin mining camp, West Kootenay: Drysdale, 15  
 Garibaldi volcanic area: Burwash, 14c  
 General: Dawson (G M), 78d, 81b; Reinecke, 16b  
 Glaciation: Dawson (G M), 78d, 79a, 81c, 88c; Lamplugh, 86  
 Atlin district: Gwillim, 02a  
 southern interior: Dawson (B M), 89d  
 Vancouver Island: Lamplugh, 86  
 Graham Island: MacKenzie, 16b  
 Interior plateaus, Savona to Lytton: Drysdale, 13  
 International boundary region: Daly, 02, 03b, 05  
 Lake basins: Parkinson, 01  
 Lardeau district: Brock, 05  
 Mountain forms in the Canadian Rockies: Coleman, 08d  
 Pacific Mountain system: Spencer (A C), 03c  
 Pleistocene volcanoes of Coast Range: Burwash, 14c

## British Columbia—Continued.

*Physiographic geology*—Continued.

- Puget Sound basin: Kimball, 97  
 Rocky Mountain region, physical history: Dawson (G M), 01  
 Rocky Mountains: Dawson (G M), 87c; Fay, 11  
 Rogers Pass: Burwash, 09  
 Rossland: Bruce, 17a  
 Shuswap area: Dawson (G M), 99a  
 Similkameen district: Camsell, 13b  
 Terraces: Begbie, 71  
 Thompson River valley: Drysdale, 14  
 Vancouver area: Burwash, 18  
 Vancouver Island: Clapp (C H), 12, 13b  
 West Kootenay sheet, glacial striae: Brock, 00a  
 Broadalbin quadrangle, N. Y.: Miller (W J), 11b  
 Broadhead, G. C., biography: Greger, 15  
 Broad Pass region, Alaska: Moffit, 15  
 Broadtop coal field, Pa.: Gardner, 13a  
 Brockocystis: Foerste, 14b  
 Broiliellus, Permian amphibian: Williston, 14b  
 Brome Mountain, Que.: Dresser, 06d  
 Bromine: Merrill (F J H), 05b; Phalen, 08d  
 Brontichthys, Cleveland shale: Claypole, 94b  
 Brontops: Marsh, 89  
 Brontosaurus: Marsh, 83a; Osborn, 06a; weight: Gregory (W K), 05  
 Brontotheridae: Marsh, 74, 76b  
 Brontotherium, restoration: Osborn, 14b  
 Brooks, T. B., biography: Willis, 01b  
 Brown, A. P., biography: Penrose, 18; Wherry, 18d  
 Brownstones, Pa.: Hopkins, 97  
 Brownsville-Connellsville folio, Pa. (no. 94): Campbell (M R), 03  
 Brush, G. J., biography: Dana (E S), 12; Ford (W E), 12b; Warren, 16a  
 Brush Creek region, Colo.: George (R D), 13a  
 Bryn Mawr gravel: Bascom, 97; Lewis, 80f  
 Bryozoa.  
 Archimedes: Hall, 57e  
 Arkansas, Fayetteville shale: Girty, 10a  
 Ascodictyon: Nicholson, 77a  
 Bearing on paleogeography: Ulrich, 11  
 Bibliography and synonymy: Nickles, 00  
 Bythopora, Nashville, Tenn.: Miller (S A), 80d  
 California, Tertiary: Arnold, 07e; Conrad, 55e  
 Canada: Ami, 95; Ordovician: Foord, 83  
 Carboniferous: Prout, 58a; Ulrich, 82  
 Chaetetes, Falls of the Ohio: Rominger, 92  
 Cincinnati: Cumings, 13; James (J F), 91; Nicholson, 75k; Ulrich, 79a, 82, 90e  
 Dekayia, etc.: Cumings, 02a  
 Homotrypa bassleri: Nickles, 02a  
 Monticuliporoidea: James (U P), 87a  
 Clinton group, Ohio: Foerste, 85  
 Coal Measures, Kansas and Missouri: Rogers (A F), 00b  
 Corynotrypa: Bassler, 11b  
 Costa Rica, Miocene: Canu, 18a  
 Cretaceous: Gabb, 62; New Jersey: Gregory (J W), 09  
 Cyclostomata, principles of classification: Canu, 18  
 Descriptions: Prout, 66  
 Development, Paleozoic: Cumings, 04  
 Devonian, Wisconsin: Cleland, 11



## Bryozoa—Continued.

- Dictyoretmon, Burlington limestone: Whitfield, 04  
 D'Orbigny's types figured: Boule, 06  
 Eocene, Atlantic Coastal Plain: Lonsdale, 45b  
 Eschara, Eocene, Alabama: Lea, 52  
 Fenestella, development: Cumings, 04, 05  
 Fenestellidae Hall, 83a; Simpson, 94; Ulrich, 86  
   Hamilton group: Hall, 83d, 87d  
   Lower Helderberg Hall, 88c  
   mode of growth and relations: Hall, 85b  
 Fistulipora: Nicholson, 85  
 General: Simpson, 94a; Ulrich, 82  
 Guadalupian fauna: Girty, 08  
 Hamilton: Hall, 83l, 84d  
 Handbook of Paleozoic: Simpson, 97  
 Helicopora: Claypole, 82a, 83  
 Homotrypa: Bassler, 03  
 Illinois, Carboniferous: Prout, 66a  
 Indiana, Batostoma, Richmond series: Cumings, 12b  
   Cincinnati series: Cumings, 08  
   Salem limestone: Cumings, 06a  
   Tanner's Creek: Cumings, 13  
 James's types: Bassler, 06  
 Maryland, Devonian: Ulrich, 13c, d; Pleistocene: Ulrich, 06  
 Minnesota, Ordovician: Ulrich, 86a  
 Miocene: Lonsdale, 45a  
 Mississippian: Ulrich, 82  
 Monticulipora: James (J F), 88d; Nicholson, 81; Nickles, 90; Rominger, 90  
 Monticuliporidae: Miller (S A), 82; Nicholson, 74g, 79; Sardeson, 01; Canada: Foord, 83  
   Cincinnati: Nicholson, 76, 80  
   development and systematic position: Cumings, 12; structure: Cumings, 15  
   massive: Nicholson, 75h  
 Moorefield shale fauna: Girty, 11  
 Nebraska, Coal Measures: Condra, 02, 03  
 New genera: Hall, 51e  
 New Jersey, Cretaceous: Gabb, 60f; Timber Creek: Lonsdale, 45  
 New Mexico: Prout, 58  
 New York, Devonian: Hall, 87  
   Hamilton group: Hall, 91b  
   Helderbergian: Hall, 74a, 79b  
   Lower Helderberg: Hall, 83b  
   Upper Helderberg: Hall, 83b  
 Ohio, Dayton region: Van Cleve, 49  
   Flint Ridge: Foerste, 87  
   Maxville limestone fauna: Morse, 11  
   Ordovician: Nicholson, 75a, c  
 Ontario, Devonian: Nicholson, 74e; and Ordovician: Nicholson, 75g  
 Ordovician: Bassler, 11; Nickles, 05  
   Indiana, Vevay: Cumings, 01b  
   Manitoba: Ulrich, 89  
   Minnesota: Ulrich, 95a  
 Paleozoic: Rominger, 66; Ulrich, 90c  
   Ctenostomata: Ulrich, 04b  
   Mississippi Valley: Prout, 58b, 59, 60  
 Panama Canal Zone: Canu, 18a  
 Patellipora: Rominger, 87  
 Quebec, Ordovician: Ami, 92b  
 Rhabdomeson, Kansas: Rogers (A F), 00d  
 Rhombopora lepidodendroides: Condra, 03a

## Bryozoa—Continued.

- Rochester shale: Bassler, 06a  
 Sceptropora: Ulrich, 88c  
 Sections of bryozoa: Foerste, 87b, 88b; James (J F), 87e, 88  
 Septopora: Meek, 70a  
 Silurian and Devonian: Ulrich, 86  
 Stomatoporoids, Cincinnati: Nicholson, 75j  
 Tertiary: Gabb, 62  
   Cheilostomata: Canu, 17  
   classification: Canu, 17a  
 Texas: Prout, 58  
 Trenton, Minn.: Ulrich, 90e  
 Trepostomata: Ulrich, 04c; structure: Cumings, 15  
 Tristylotus, Devonian, Hudson Bay slope: Parks, 04a  
 Unitrypa, development: Cumings, 04  
 Upper Helderberg: Hall, 83l  
 Van Cleve's fossil corals: Hall, 83h  
 Waverly, Ohio: Ulrich, 88  
 Wisconsin, Delafield: Buell, 82  
 Buchanan gravels, Iowa: Calvin, 96b  
 Buckhannon folio, W. Va. (no. 34): Taff, 96  
 Buckley, E. R., biography: Buehler, 13; Anon, 12  
 Buda quadrangle, Va.: Hinds, 16  
 Buda limestone, Tex.: Shattuck, 03; fauna: Whitney (F L), 11  
 Buena Vista, use of term: Prosser, 06a  
 Buffalo coal field, Wyo.: Gale, 10d  
 Buffalo Peaks, Colo.: Emmons (S F), 83  
 Buffalo quadrangle, N. Y.: Luther, 06  
 Buhrstone, Virginia: Watson, 07e  
 Building stone, *See also* Granite; Limestone; Sandstone; Stone.  
 Characters: Julien, 98  
 General: Buckley, 00; Culin, 16e; Day (W C), 92, 95; Eckel, 12; Hall, 68; Hawes, 84; Hopkins (T C), 96b; Julien, 84; Merrill (G P), 89, 91, 98, 99b; Richardson (C H), 17; Ries, 12; Van Hise, 00b  
 Kersantite: Newberry, 87  
 Microscopic structure: Merrill (G P), 84a  
 Minerals in building stones: Luquer, 94  
 New England: Beals, 97  
 Saltsburg sandstone: Brown (S B), 18  
 Sandstone disintegration: Merrill (G P), 00d  
 Southern States: Burchard, 12  
 United States: Day (W C), 96; Hawes, 84; Merrill (G P), 85e; east of Mississippi River: Burchard, 12b  
 U. S. National Museum collection: Merrill (G P), 89  
 Bulkley Valley, B. C.: Leach (W W), 08, 09  
 Bullfrog district, Nev.: Emmons (W H), 07b; Ransome, 07, 10c; Rice (C T), 06b; Tallman, 09.  
 Bull Mountain coal field, Mont.: Lupton, 11; Richards (R W), 09; Woolsey, 09, 17  
 Bully Hill district, Cal.: Boyle, 14  
 Bunotheria: Cope, 83j  
 Burgettstown quadrangle: Griswold, 07a  
 Burgettstown-Carnegie folio, Pa. (no. 177): Shaw (E W), 11d  
 Burlington limestone: Niles, 66; interrupted deposition: Fultz, 94a  
 Burlington quadrangle, Vt.: Perkins (G H), 10c



Burlington region, Vt.: Hitchcock (C H), 06  
 Burning of coal beds in place: Bowie, 14; Rogers (G S), 17  
 Burnthill Brook area, N. B.: Young, (G A), 18  
 Burro Mountain copper district, N. Mex.: Bush, 14; Lang (S S), 06; Stauber, 10; Wade, 07; Zalinski, 07c  
 Burrows, Paleozoic: Dawson (J W), 90b  
 Butte district, Mont.: Weed, 12  
 Butte special folio, Mont. (no. 38): Weed, 97  
 Byron oil field, Wyo.: Rogers (A P), 13  
 Bysmaliths: Iddings, 98b; Weed, 99d  
 Caddo oil and gas field, La.: Hopper, 11  
 Cadmium: Siebenthal, 09  
 Caesium: Browning, 17  
 Cahaba coal field, Ala.: Butts, 07c, 11  
 Cahuilla Basin, Cal.: Blake (W P), 14; Free, 14a  
 Cairnes, D. D., biography: Camsell, 18c  
 Calamine, origin, Missouri: Seamon, 90  
 Calaveras formation: Turner, 93a  
 Calaveras skull. *See* California.  
 Calaverite, Cripple Creek, Colo.: Hillebrand, 95  
 Calceocrinidae: Ringueberg, 89  
 Calcisphaera: Knowlton, 89b  
 Calcite: Whitlock, 09; crystal forms: Rogers (A F), 01a; Schaller, 08a; crystallographic notes on: Pogue, 09; solubility in water: Wells, 15b, 18a  
 Calcite group: Ford (W E), 17  
 Calcite-brucite rocks, origin: Rogers (A F), 18  
 Calcite-sand crystals: Barbour, 02b  
 Calcium carbonate: Day (A L), 16; the several forms: Johnston (J), 16a  
 Calcium carbonate deposition, rôle of inorganic agencies: Johnston (J), 16, 16c  
 Calcium carbonate deposition and bacteria: Kellerman, 15  
 Calcium chloride: Phalen, 68d  
 Caliche, southern Ariz.: Blake (W P), 01b, 08c  
 Calico district, Cal.: Palmer (L A), 18  
 California.  
   Amargosa Valley, nitrate prospects: Free, 12  
   Ancient river channels: Jacobs, 77  
   Bibliography: Vogdes, 93a, 96, 04, 05  
   Blue gravel: Goldsmith, 74b  
   Calaveras skull: Ayres, 82; Becker, 91a; Blake (W P), 99a; Boutwell 11; Brewer, 66b; Hitchcock (C H), 70f; Holmes (W H), 99; Koch, 11; McGee, 99; Marcou, 83; Merriam, 10d; Whitney, 67a, 68e; Winslow, 57, 73; Wright (G F), 91a  
   Catalog of publications of State Mining Bureau: Boalich, 18b  
   Chromic iron and serpentine: Newberry, 74n  
   Del Norte Co., Black Diamond: Hershey, 09a  
   Diamonds: Storms, 17; microscopic: Silliman (jr), 73d  
   Eastern Cal.: Conkling, 77, 78  
   Farallon Islands: Blankinship, 92  
   General: Becker, 85; Buckland, 39; Cooper (J G), 90; Cope, 80c; Dana, 49b; Diller, 84a; Frignet, 65; Grewingk, 48; Jackson, 66a; Le Conte (J L), 51; Marcou, 55, 66, 75b; Privat-Deschanel, 02; Rath, 86; Richthofen, 64a; Turner, 93; Whitney, 66a; Yates, 02  
   Geologic structure: Ransome, 06

## California—Continued.

Geological notes: Comstock, 02a  
 Geological survey: Whitney, 61, 63a, 68  
   continuance: Cal Ac Sc, 76  
   operations: Whitney, 64a, 65a  
   progress: Whitney, 62b, 63, 64b, 66, 67, 68a, 71, 73  
 Imperial Co.: Merrill, 14  
 Index to publications of State Mining Bureau: Yale, 07  
 Inyo Co.: Taft, 07  
 Itacolumite, Mariposa Co.: Blake, 77  
 Mexican boundary region: Emory, 57a; Parry, 57b  
 Napa and Lake cos.: Rath, 85h  
 Oil-field waters, San Joaquin Valley: Rogers (G S), 17a  
 Owens Basin: Gale, 14g  
 Owens Valley: Lee, 06; Rockwood, 72a  
 Panamint Valley: Gale, 14g  
 Pedological geology: Hilgard, 01  
 Potter Creek cave, Shasta Co.: Sinclair, 03b  
 Reconnaissance in eastern Cal.: Ball (S H), 07  
 River channels, ancient: Kimble, 07a  
 Salt deposits of Salton Sea: Blake (W P), 08  
 San Diego Co.: Fairbanks, 00; Merrill, 14  
 San Diego to Gila River, southern Cal.: Parry, 57c  
 San Francisco region: Rath, 85j  
 Santa Cruz quadrangle: Branner, 09b  
 Searles Lake: Gale, 14g; Hammon, 12, 12a  
 Sequoia: Muir, 77  
 Sierra Nevada: Schiel, 55  
 Soil geology: Hilgard, 84e  
 Soils, San Joaquin Valley: Mendenhall, 08b  
 Sonorous sands: Bolton, 90a  
 Southern Cal.: Rath, 85k; Williamson, 55  
 State geologist, reports: Whitney, 63, 64, 69  
 State mineralogist, reports: Crawford (J J), 94, 96; Hamilton, 16; Hanks, 81; Ireland, 88, 88a, 90, 90a, 93  
 State Mining Bureau: Storms, 12c  
   publications, catalog: Boalich, 18b; index: Yale, 07  
 Taylorsville region, drainage during auriferous gravel period: Diller, 06a  
 Tehachapi Valley: Lawson, 06b  
 Truckee basin: Taylor (L H), 02  
 Yosemite National Park: Kemmerling, 15  
 Economic geology.  
   Alleghany district: Ferguson (H G), 14a  
   Alpine Co.: Eakle, 17a  
   Amador Co.: Heydon, 97a; Storms, 99; Tucker, 15  
   Angels, Calaveras Co.: Collier, 00  
   Anticlinal dome structure in oilfields: Hager, 13  
   Antimony: Boalich, 18a  
   Asphalt: Eldridge, 01; Goodyear, 88; Hilgard, 85; Weber, 88  
     origin: Cooper (A S), 93, 99  
   Ventura Co.: Hilgard, 90  
   Auriferous beach sands: De Groot, 90  
   Auriferous black sands: Day (D T), 07; Edman, 94, 07  
   Auriferous conglomerate: Fairbanks, 95b; Siskiyou Co.: Dunn, 94  
   Auriferous deposits: Bowman, 73



## California—Continued.

*Economic geology—Continued.*

- Auriferous ferro-dolomites: Storms, 11c  
 Auriferous gravel channels, Sierra Co.: Alling, 14  
 Auriferous gravel region: Pettee, 80  
 Auriferous gravels: Davidson (G), 73a; Goodyear, 79, 80; Hanks, 01; Jacobs, 77; Lakes, 94a  
 Sierra Nevada: Fuchs, 85; Whitney, 80  
 Siskiyou Co.: Hall (F H), 93  
 Sonora: Davis (H), 55  
 Beach placers of Pacific coast: Irvine, 08  
 Bitumen accumulations: Cooper (A S), 99a  
 Bituminous rock deposits, San Luis Obispo: Fairbanks, 98b; Santa Barbara Co.: Cooper (A S), 98  
 Bituminous substances, southern California: Peckham, 82  
 Borate deposits: Wainwright, 09; Ventura Co.: Co.: Gale, 14e  
 Borax: Bailey, 06; Burkart, 74e; Hanks, 83; Harris (R P), 65; Keyes, 09f; Phillips (J A), 77; Strong, 10; Whitney, 66b; Yale, 92, 04, 13  
 Death Valley: Hart, 03; Campbell (M R), 02b  
 eastern Cal.: Campbell (M R), 03d  
 Mohave Desert: Campbell (M R), 02b  
 Ryan: Gale, 12b  
 Brine, Searles Lake: Hicks (W B), 16  
 Building stone: Aubury, 06; Irelan, 88; Jackson (A W), 88  
 Bully Hill district: Boyle, 14  
 Butte Co.: Waring (C A), 17a; Magalia mine: Gassaway, 99  
 Calaveras Co.: Tucker, 15; ancient channel system: Storms, 94; Salt Spring Valley: Goodyear, 68  
 Calico district, San Bernardino Co.: Palmer (L A), 18; Storms, 90  
 Carbonate of soda, Great Basin: Knapp (S A), 98  
 Cantua-Panoche region: Anderson (R), 11  
 Celestite: Phalen, 14; Lavic, San Bernardino Co.: Mallery, 16  
 Cement materials: Aubury, 06; Eekel, 13  
 Central Cal.: Trask, 54a  
 Chalcocite, primary: Hershey, 08a  
 Chromic iron ore: Diller, 13a  
 Chromite deposits: Harder, 10a; Shasta Co.: Diller, 17a  
 Chromium: Boalich, 17; Bradley (W W), 18  
 Cinnabar deposits, genesis: Christy, 79  
 Clay: Aubury, 06  
 Coal: Brown (R), 70; Cooper (J G), 74; Edwards, 06; Fairbanks, 96h; Goodyear, 77, 88; Ritter, 06b; Smith (G O), 02; Turner, 93b  
 Corral Hollow: Goodyear, 82a  
 Mt. Diablo Range: Arnold, 06b; Blake (W P), 67j; Campbell (M R), 07d; Goodyear, 82  
 Monterey Co.: Arnold, 06b; Campbell (M R), 07d  
 Northern Cal., Chico group: Diller, 85a  
 San Benito Co.: Campbell (M R), 11  
 Coast ranges: Trask, 54, 55; Whitney, 82  
 Coffee Creek district, Trinity Co.: Hershey, 99f  
 Colemanite deposits, origin: Gale, 13

## California—Continued.

*Economic geology—Continued.*

- Colfax quadrangle: Lindgren, 00  
 Colorado Desert: Orcutt, 90  
 Colorado Desert mining district: Bowers, 01  
 Colorado River region, copper: Hately, 07; nitrate deposits: Turner, 07a  
 Colusa Co.: Bradley (W W), 15b  
 Colusa, Lake, and Napa cos.: Fairbanks, 93a  
 Comstock lode: Rodgers, 11  
 Contact-metamorphic deposits, Sierra Nevada Mountains: Turner, 04  
 Copper: Aubury, 02, 08; Lang, 99, 08; Liebenam, 07; O'Shaughnessy, 99; Reid (J A), 08b; Weed, 06  
 Bully Hill district: Boyle, 14  
 chalcocite, primary: Hershey, 08a  
 Colorado River region: Hately, 07  
 Copperopolis: Reid (J A), 07a, 08a; Turner (H W), 07  
 Eldorado Co.: Knight (C Y), 07  
 Greenwater district: Boyle, 07; Nicholas, 07b; Zalinski, 07  
 Kern Co., Greenback mine: Turner, 02b  
 northern Cal.: Diller, 02e  
 Plumas Co.: Turner, 14  
 Redding region: Diller, 03a  
 Shasta Co.: Anderson (F M), 02b; Campbell, (D F), 07; Forstner, 07, 08a; Gilbert, 13; Graton, 10; Martin (A H), 08a, 10; Packard, 09a; Storms, 13b; Whitman, 13  
 Sierra Nevada foothills: Benjamin, 08; Forstner, 08; Hershey, 08b; Knopf, 06; Lang, 07, 08; Reid (J A), 08b, e  
 Siskiyou Co.: Purington, 07a; Cottonwood district: Turner, 03b  
 Tehama Co.: Martin (A H), 08  
 Woody district, Kern Co.: Storms, 13c  
 Daggett, San Bernardino Co.: Storms, 92  
 Darwin district, Inyo Co.: Knopf, 14b  
 Death Valley: Young (G J), 18  
 Del Norte Co.: Lowell, 15  
 Desert dry lakes: Bailey (G E), 04  
 Diatomaceous earth, Santa Barbara Co.: Arnold, 07e  
 Downieville quadrangle: Turner, 97  
 Eastern Cal.: Ball (S H), 06a; Conkling, 78  
 Eldorado Co.: Bowman (A), 74; Fairbanks, 94b; Heydon, 97a; Tueker, 17  
 Engels deposits: Graton, 18  
 Feather River black sands: Sperry, 12  
 Folded vein, Banner district, San Diego Co.: Fairbanks, 94f  
 Fresno Co.: Bradley (W W), 15a  
 Gem districts of San Diego Co.: Lestrangle, 10  
 Gem mining: Martin (A H), 10d  
 Gems, jeweler's materials, and ornamental stones: Kunz, 05  
 Gems, southern Cal.: Sovereign, 05  
 General: Antisell, 56; Becker, 85; Blake (W P) 55a, c, 57, 66, 81b; Burkhart, 69a; Cal M As 99; Crawford (J J), 94, 96; Fairbanks, 97d; Frignet, 66; Guillemin-Tarayre, 67e, 69, 71; Hanks, 82, 83, 84, 85, 86; Irelan, 87, 88, 90, 90a, 93; Jackson, 66c; Newberry, 56; Rath, 86; Riechthofen, 64; Thureau, 79; Trask, 55c; Tyson, 50; Whitney, 65



## California—Continued.

*Economic geology—Continued.*

Gold: Amador, 06; Ansted, 49; Blake (W P), 54d, 55c, 67e; Bordeaux, 01, 02; Bowie, 79; Browne (R E), 95; Burkhardt, 56, 70a; Credner, 66a; Doolittle, 05; Hammond (J H), 90, 90a; Irelan, 87; Jackson, 65c; Lakes, 06b; Laur, 61, 63; Lyman (C S), 49; Marcou 55f, 58; Patterson, 62; Phillips (J A), 68; Simonin, 60; Storms, 97, 98, 00b, 03, 06a; Trask, 54a, 55c; Turner, 94b, 95b; Thureau, 79; Wilson (J S), 54  
 Allegheny district: Ferguson (H G), 14a; Martin (A H), 09a  
 Amador Co.: Storms, 09a  
 American River: Blake (W P), 64b  
 ancient river channels: Scupham, 98  
 auriferous ferro-dolomites: Storms, 11c  
 beach placers: Irvine, 08  
 Bidwell Bar quadrangle: Turner, 98  
 Big Trees quadrangle: Turner, 98a  
 Bodie district: McLaughlin, 07; Standard mine vein system: Brown, (R G), 07  
 Butte Co.: Hubbard (J D), 16  
 Calaveras Co.: Goodyear, 68  
 Cape Blanco: Blake (W P), 54c  
 Coalinga region: Pack, 14b  
 Coffee Creek district: Stines, 07  
 Colfax quadrangle: Lindgren, 00  
 Cottonwood district, Siskiyou Co.: Turner, 03b  
 Downieville quadrangle: Turner, 97  
 eastern Cal.: Ball (S H), 06a, 07; Fairbanks, 96d  
 Eldorado Co.: Heydon, 97; Kimble, 07  
 Feather River region: McLennan, 16  
 Forest Hill Divide: Browne (R E), 90  
 Glenn Co.: Bradley (W W), 15b  
 Gold Bluffs, Klamath Co.: Chase, 74, 74a  
 Goler, Red Rock Range: Nason, 90b  
 Grass Valley, Nevada Co.: Corning, 86; Lindgren, 96b; Martin (A H), 09b; Silliman (jr), 67  
 High Grade district: Stines, 12; Storms, 12a  
 Inyo Range: Reid (J A), 07f  
 Jackson quadrangle: Turner, 94  
 Kern Co., Yellow Aster mine: Storms, 09  
 King Solomon mine, Siskiyou Co.: Hershey, 01e  
 Klamath River: Chase, 73b  
 Los Burros district: Davis (C H), 12  
 Mariposa Co.: Rolker, 79  
 Meadow Lake, Nevada Co.: Lindgren, 93b  
 Modoc Co., Hoag district: Stines, 10  
 Mojave district: Bateson, 06; Exposed Treasure lode: DeKalb, 07  
 Mother Lode belt: Fairbanks, 90, 96; Prichard, 04; Ransome, 00; Reid (J A), 07d; Storms, 00, 09; Turner, 09  
 Nevada City area: Lindgren, 96, 96b; Martin (A H), 10c  
 Nevada Co.: Grimsley, 99b; Silliman (jr), 65a  
 occurrence: Attwood, 88  
 Ophir: Lindgren, 94b  
 Oroville: Knox, 03  
 Pine Hill: Lindgren, 92  
 Placer and Calaveras cos.: Silliman (jr), 67a

## California—Continued.

*Economic geology—Continued.*

Gold: Placer Co., Helester mines: Storms, 11  
 pocket deposits, Klamath Mountains: Ferguson (H G), 15  
 pockets, origin of: Hershey, 10  
 primary deposits, Sierra Nevada: Lindgren, 98c  
 Pyramid Peak quadrangle: Lindgren, 96a  
 Randsburg quadrangle: Hess, 10a  
 San Diego Co.: Reinholt, 11  
 Seneca district: Wright (W H), 15  
 Shasta Co., Harrison Gulch: Kramm, 12  
 Sierra Costa Mountains: Hershey, 00  
 Sierra Nevada: Bowman (A), 75; Dron, 00; Lindgren, 11; Reyer, 86; Turner, 96, 99a; western: Lang (H), 07  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora, Tuolumne Co.: Vivian, 65  
 Sonora quadrangle: Turner, 97a  
 Taylorsville region: Diller, 93b, 08b  
 Trinity Co.: Hershey, 97f, 99, 99a; MacDonald (D F), 10; Carrville district: MacDonald (D F), 13  
 Trinity River basin: Diller, 11a  
 Truckee quadrangle: Lindgren, 97  
 veins in granite: Storms, 06a  
 Weaverville quadrangle: Diller, 14; Ferguson (H G), 14  
 Weaverville-Trinity Center gravels: MacDonald (D F), 10  
 with cinnabar, Colusa Co.: Blake (W P), 66b  
 Yuba River: Credner, 66a  
 Gold belt: Kerr, 96; Lindgren, 94  
 Gold dredging: Doolittle, 05  
 Gold placers: Cal St M Bur, 10  
 Gold quartz veins: Lindgren, 95b, 96d  
 Gold-silver veins, Ophir: Lindgren, 94b  
 Granite: Aubury, 06  
 Graphite: Aubury, 06; Boalich, 18a  
 Gravel channels, ancient: Storms, 05  
 Gypsum: Aubury, 06; Fairbanks, 04a; Hess, 10  
 Bully Hill district: Boyle, 14  
 Cane Springs, Kern Co.: Hess, 10b  
 Maria Mountains: Surr, 11a  
 Palen Mountains, Riverside Co.: Harder, 10f  
 Harrison Gulch, Shasta Co.: Kramm, 12  
 Helester mines, Placer Co.: Storms, 11  
 High Grade district: Stines, 12; Storms, 12a  
 Hoag district, Modoc Co.: Stines, 10  
 Hodson, Royal mine, ore genesis: Forstner, 04  
 Humboldt Co.: Lowell, 15; Stalder, 15; Eel River valley: Harmon, 15  
 Imperial Co.: Merrill, 14  
 Indian Valley region: Diller, 05  
 Infusorial earth: Finch (W W), 87  
 Inyo and White Mountains: Knopf, 14a  
 Inyo Co.: Taft, 05; Waring (C A), 17b  
 Inyo, Mono, and Alpine cos.: Fairbanks, 94a  
 Inyo Range and eastern slope of southern Sierra Nevada: Knopf, 18  
 Iron ores: Aubury, 06; Harder, 10b; Jones (C C), 10; Leith, 06; Whittier, 17  
 desert region: Jones (C C), 09  
 Eagle Mountains: Harder, 12  
 Inyo County: Taft, 06a  
 Inyo Range: Reid (J A), 07f



## California—Continued.

*Economic geology—Continued.*

Iron ores: Jackson quadrangle: Turner, 94  
 magnetite ores: Prescott, 08a  
 Redding quadrangle: Diller, 03b  
 San Bernardino Co.: Jones (C C), 09; Iron  
 Age deposit: Harder, 10c  
 Shasta Co.: Campbell (D F), 06; Prescott, 08a  
 western and central Cal.: Harder, 10b  
 Kern Co.: Brown (G C), 15b  
 Red Rock, Goler, and Summit districts:  
 Fairbanks, 94  
 Yellow Aster mine: Storms, 09  
 Kings Co.: Bradley (W W), 15a  
 Lake Co.: Bradley (W W), 15b  
 Lapis lazuli, southern Cal.: Surr, 13  
 Lassen Co.: Preston (E B), 90; Tucker, 17a  
 Lead, Darwin district: Knopf, 14b; Inyo  
 Range: Knopf, 18  
 Leona Heights ore deposit, genesis: Mace, 11  
 Leona rhyolite: Clark (C W), 17  
 Limestone: Eckel, 13; Redding district: Dil-  
 ler, 03c  
 Lithology of wall rocks: Attwood, 88  
 Los Angeles Co.: Preston (E B), 90; mineral  
 resources: Merrill (F J H), 17  
 Los Burros district: Davis (C H), 12  
 Madera Co.: McLaughlin, 15a  
 Magnesite: Gale, 14f; Hess, 06a, 08f; Spinks,  
 04; Yale, 13, 16a; Bissell: Palmer (L A)  
 16c  
 Manganesc: Boalich, 17; Bradley (W W), 18;  
 Harder, 10; Louderback, 18; Owl Head,  
 San Bernardino Co.: Mann, 16  
 Marble, Barstow: Pack, 14  
 Marin Co.: Bradley (W W), 15b  
 Mariposa Co.: Lowell, 15a; Storms, 99a  
 Marysville quadrangle: Lindgren, 95  
 Masonic district, Mono Co.: McLaughlin, 15b  
 Mendocino Co.: Lowell, 15  
 Mica: Aubury, 06  
 Mineral production, 1913: Boalich, 14; 1914:  
 Hamilton, 15; 1915-7; Bradley (W W),  
 16, 17, 18b  
 Mineral resources: Cal M Bur, 08; Ireland, 88a;  
 Yale, 99  
 Mines and minerals: Cal M Bur, 00  
 Mining districts: Wheeler (G M), 72a  
 Modoc Co.: Tucker, 17b  
 Mohave desert: Endlich, 96  
 Mojave district: Bateson, 06; Exposed Treasure  
 lode: DeKalb, 07  
 Molybdenite, Ramona, San Diego Co.: Cal-  
 kins, 16  
 Molybdenum: Boalich, 18; Hess, 08b  
 Mono Co.: Eakle, 17b  
 Monterey Co.: Waring (C A), 17c; Stone Can-  
 yon, coal: Campbell (M R), 07d  
 Mother Lode: Browne (R E), 98; Eddy, 13;  
 Fairbanks, 96, 96i; Lindgren, 06; Ransome,  
 00; Reid (J A), 07d; Storms, 95a, 00, 09b,  
 12b; Turner, 09a; Wolf, 13; Tuolumne  
 Co.: Storms, 04  
 Napa Co.: Bradley (W W), 15b

28738°—24—5

## California—Continued.

*Economic geology—Continued.*

Natural gas: Goodyear, 88; Watts (W L), 94,  
 01; Weber, 88  
 Kern Co., south Midway field: Forstner, 10  
 Miner ranch field: Arnold, 08c  
 Summerland: Wheelan, 90  
 Nevada City area: Lindgren, 96; Martin (A H),  
 11  
 Nickel: Boalich, 18a; San Diego Co.: Calkins,  
 16a  
 Nitrate deposits: Gale, 12; Ochsenius, 02  
 Northeastern Cal.: Hill (J M), 15  
 Northern Cal.: De Quille, 95a; Trask, 56  
 Oil fields: Arnold, 14; Pack, 17a; Prutzman,  
 12, 13; Requa, 10, 11, 12  
 anticlinal dome structure: Hager, 13, 14  
 faulting: Hager, 14a  
 unconformities and overlap: Hager, 14b  
 Oil prospects, Salinas Valley-Parkfield district:  
 English, 18  
 Oil wells, Los Angeles Co., register: Blackmar,  
 03  
 Orange Co., mineral resources: Merrill (F J H),  
 17  
 Ore deposition and enrichment at Engels: Gra-  
 ton, 17; Tolman, 17  
 Ore deposits, eastern Cal.: Fairbanks, 96d  
 Ore formation, Sulphur Bank: Le Conte, 82a  
 Petroleum: Anderson (R), 15; Arnold, 15a;  
 Claypole, 01; Cooper (A S), 01; Eldridge,  
 03a; English, 16; Goodyear, 88; Heur-  
 teau, 03a; Fairbanks, 99; McLaughlin,  
 15; Prutzman, 04; Silliman (jr), 65; Tru-  
 man, 02; Watts (W L), 94, 99, 99a, 00, 01;  
 Weber, 88  
 Cantua-Panoche region: Anderson (R), 11  
 Cat Canyon field: Smith (H D), 13  
 Coalinga field: Arnold, 08g, h, 10; Forstner,  
 09, 09b; Pack, 14b; Prutzman, 10  
 Colorado Desert: Bowers, 01  
 Fresno Co.: Parsons (H G), 00a  
 gravity variation due to sulphur: Rogers  
 (G S), 17c  
 Kern Co.: Parsons (H G), 00; south Midway  
 field: Forstner, 10  
 Kern River fields: Anderson (F M), 11  
 Kreyenhagen field: Forstner, 09  
 Los Angeles: Arnold, 06c; Barbour (P E), 09;  
 Eldridge, 07  
 Los Angeles, Ventura, and Santa Barbara cos:  
 Watts, 97  
 McKittrick district: Gester, 17  
 McKittrick-Sunset region: Arnold, 10a  
 Midway field: Forstner, 10, 11  
 Miner Ranch field: Arnold, 08c  
 origin: Cooper (A S), 93, 99; Edwards (A M),  
 08; Prutzman, 10a  
 Pico Canyon field: North, 90  
 Salt Lake field: Arnold, 06c  
 San Joaquin Valley: Anderson (R), 12; Pack,  
 16  
 Santa Barbara and Los Angeles cos.: Silliman  
 (jr), 65b



## California—Continued.

*Economic geology*—Continued.

- Petroleum: Santa Barbara Co.: Silliman (jr), 65  
 Santa Clara Valley, Puente Hills, and Los Angeles oil districts: Eldridge, 07  
 Santa Maria district: Arnold, 07d, f; Prutzman, 15  
 Santa Susanna district: Johnson (H R), 13  
 Sargent field: Jones (W P), 11  
 southern Cal.: Fairbanks, 96g; Peckham, 82, 94a, 95; Prutzman, 13  
 South Mountain field, Ventura Co.: Hager, 15  
 Summerland district: Arnold, 07e; Cooper (A S), 98a  
 Tulare Valley: Blake (W P), 66d  
 Placer Co.: Waring (C A), 17d; Forest Hill Divide: Browne (R E), 90  
 Placerville quadrangle: Lindgren, 94  
 Platinum: Day (D T), 10; Cape Blanco: Blake (W P), 54c  
 Pliocene rivers: Bowman, 73  
 Potash: Boalich, 18a  
 Death Valley: Anon, 13b  
 Searles Lake: Dolbear, 13; Gale, 13b; Hammon, 12, 12a; Hicks (W B), 16  
 Pyramid Peak quadrangle: Lindgren, 96a  
 Pyrite, Leona rhyolite: Clark (C W), 17; Plumas Co.: Bradley, 13  
 Quicksilver: Aubury, 03; Becker, 88, 89, 93; Blake, 78; Bradley (W W), 18a; Burkhardt, 56; Christy, 79; Demaret, 04; Forstner, 04a; Goodyear, 82b; Rolland, 78a,b; Veatch, 14; Wagoner, 82; Wilson (J S), 54  
 Almaden: Blake (W P), 54a  
 New Almaden: Silliman (jr), 64b  
 San Luis Obispo Co.: Leicht, 99  
 Sonoma Co.: Palmer (L A), 14  
 Rare metals, Plumas Co.: Edman, 98  
 Redding district: O'Brien, 03  
 Redding quadrangle: Diller, 04, 06  
 Replacement deposits, Sierra Nevada: Turner, 99a  
 Riverside Co., mineral resources: Merrill (F J H), 17  
 Sacramento Co.: Waring (C A), 17d  
 Sacramento quadrangle: Lindgren, 94a  
 Saline deposits: Bailey (G E), 02  
 Death Valley: Gale, 14a  
 Saline Valley: Gale, 14b  
 Searles Lake: Dolbear, 14  
 southeastern Cal.: Gale, 14g  
 Salt: Eckel, 04d; Salton: Holder, 01  
 San Benito Co.: Bradley (W W), 17a  
 San Bernardino Co.: Cloudman, 17; Crossman, 90  
 San Diego Co.: Goodyear, 90; Hanks, 86; Merrill, 14; Orcutt, 87  
 San Diego, Orange, and San Bernardino cos.: Fairbanks, 93b  
 San Francisco district: Lawson, 14  
 San Joaquin Co.: Lowell, 15a  
 San Joaquin Valley: Anderson (R), 12; west border: Anderson (R), 15  
 San Luis quadrangle: Fairbanks, 04  
 San Luis Obispo Co.: Logan, 17  
 Santa Barbara Co.: Huguenin, 17  
 Santa Clara Co.: Weber, 90

## California—Continued.

*Economic geology*—Continued.

- Santa Cruz quadrangle: Branner, 09b  
 Seneca mining district: Wilson (F L), 11; Wright (W H), 15  
 Shasta Co.: Brown (G C), 15; Fairbanks, 93  
 Sierra Co.: Alling, 14  
 Sierra Nevada: Bowman (A), 75; Storms, 12; Trask, 53, 53a, 54, 55a; Turner, 96  
 Silver: Jackson, 65c  
 Calico: Lindgren, 87  
 Darwin district: Knopf, 14b  
 eastern Cal.: Ball (S H), 06a, 07; Fairbanks, 96d  
 High Grade district: Stines, 12; Storms, 12a  
 Inyo Range: Knopf, 18; Reid (J A), 07f  
 Modoc Co., Hoag district: Stines, 10  
 Ophir: Lindgren, 94b  
 Placer and Calaveras cos.: Silliman (jr), 67a  
 Siskiyou Co.: Brown (G C), 15; New York mine, fault system: Gunther, 05a  
 Slate: Dale, 06c; Eckel, 04b, f  
 Smartsville quadrangle: Lindgren, 95a  
 Soapstone: Aubury, 06  
 Soda deposits: Ochsenius, 02  
 Sodium sulphate, San Luis Obispo Co.: Arnold, 09d; Gale, 14d  
 Solano Co.: Bradley (W W), 15b  
 Sonoma Co.: Bradley (W W), 15b  
 Sonora, Tuolumne Co.: Vivian, 65  
 Southern Cal.: Trask, 56  
 Stanislaus Co.: Lowell, 15a  
 Strontianite, Barstow, San Bernardino Co.: Knopf, 18c  
 Strontium: Boalich, 18a  
 Structural and industrial materials: Aubury, 06  
 Sulphur: Aubury, 06  
 Sutter Co.: Waring (C A), 17a  
 Talc: Aubury, 06  
 Taylorsville region: Diller, 08b  
 Tehama Co.: Fairbanks, 93a; Tucker, 17c  
 Tertiary gravels in Sierra Nevada: Lindgren, 11  
 Tin: Boalich, 18a  
 San Diego Co.: Schaller, 16  
 Temescal: Fairbanks, 97c  
 Tourmaline, San Diego Co.: Cowan, 10; southern Cal.: Schaller, 04b  
 Trinity Co.: Brown (G C), 15; Hershey, 97f  
 Truckee quadrangle: Lindgren, 97  
 Tulare Co.: Tucker, 17  
 Tungsten: Aubury, 06; Boalich, 18  
 Inyo Co.: Knopf, 17  
 Kern Co.: Storms, 16  
 Rand district: Dolbear, 10; Nevius, 16  
 Raymond: Hess, 08d  
 San Bernardino Co.: Williams (J H), 11  
 southern Cal.: McDonald (P B), 16  
 Tuolumne Co.: Tucker, 15  
 Vanadium: Boalich, 18  
 Vanderbilt district, San Bernardino Co.: Storms, 99g  
 Vein crossings, Grass Valley: Hoover, 96  
 Veins in granite: Storms, 99c  
 Ventura Co.: Huguenin, 17  
 Wall rocks of gold mines: Storms, 95  
 Yolo Co.: Bradley (W W), 15b  
 Yuba Co.: Waring (C A), 17d  
 Zinc: Aubury, 02a; Sierra Nevada: Knopf, 18



## California—Continued.

*Historical geology.*

- Alameda Creek basin: Clark (W O), 15  
 Alpine Co.: Eakle, 17a  
 Amador Co.: Heydon, 97a  
 Andalusite mass, Inyo Range: Knopf, 17a  
 Angel Island: Ransome, 94  
 Archean gneiss, Sierra Nevada: Turner, 96b  
 Asphalt bed, Rancho La Brea: Denton, 76  
 Astoria series, Mount Diablo region: Clarke (B L), 17  
 Auriferous conglomerate: Fairbanks, 95b  
   Jurassic, Sierra Nevada: Lindgren, 94c  
   Siskiyou Co.: Dunn, 94  
 Auriferous gravels: Hammond (J H), 90;  
   Hanks, 01; Holmes (W H), 99; McGee,  
   99; age: Diller, 07a; Lindgren, 96c  
   Sierra Nevada: Turner, 95a; Whitney, 80  
   Siskiyou Co.: Hall (F H), 93  
 Auriferous slates, Sierra Nevada, age: Smith  
   (J P), 94b  
 Bacillaria beds: Ehrenberg, 72  
 Barstow-Kramer region: Pack, 14a  
 Berkeley Hills: Lawson, 02  
 Bidwell Bar quadrangle: Turner, 98  
 Big Trees quadrangle: Turner, 98a  
 Bragdon formation: Diller, 05c; Hershey, 04  
 Bully Hill district: Boyle, 14  
 Cahuilla Basin: Free, 13a, 14a  
 Calaveras Co.: Patton, 55; Salt Spring Valley:  
   Goodyear, 68  
 Calaveras formation: Turner, 93a  
 Calico district, San Bernardino Co.: Palmer  
   (L A), 18  
 Cambrian, Lower: Walcott, 95b  
 Cambrian rocks, southeastern Cal.: Darton, 07  
 Cantua-Panoche region: Anderson (R), 11  
 Carboniferous: Trask, 55b  
 Carmelo Bay: Lawson, 93d  
 Carrizo Creek beds: Arnold, 94  
 Carrizo Mountain, San Diego Co.: Mendenhall, 10  
 Carrizo Valley, Imperial Co.: Vaughan, 17  
 Chance formation, Tejon Hills: Merriam, 16c  
 Channel Islands: Yates, 90a  
 Chico-Tejon series: Stanton, 96b  
 Coal in Chico group: Diller, 85a  
 Coalinga district: Arnold 08g, 09a, 10  
 Coalinga region: Nomland, 16a  
 Coast, Bodega Bay to San Diego: Blake (W P),  
   56b  
 Coast Ranges: Becker, 85a, 89; Fairbanks, 92,  
   93c, 94d, 95a, 96e; Lawson, 95a; Trask, 54,  
   55; Turner, 94d, 98b; Whitney, 82; Willis,  
   00a  
   north of San Francisco, section: Osmont, 05  
   San Francisco region: Lawson, 03a  
   southern: Anderson (F M), 04; Fairbanks, 98  
 Colfax quadrangle: Lindgren, 00  
 Colorado Desert: Orcutt, 90  
 Coso Range: Reid (J A), 08  
 Colusa, Lake, and Napa cos.: Fairbanks, 93a  
 Copper region, northern Cal.: Diller, 02f  
 Cretaceous: Anderson (F M), 02; Becker, 91b;  
   Conrad, 67a; Gabb, 67  
   northern Cal.: Diller, 85a, 90a, 93  
   Santa Ana Mountains: Packard (E L), 16  
 Cretaceous-Eocene relations: Stanton, 96

## California—Continued.

*Historical geology—Continued.*

- Cretaceous metamorphic rocks: Becker, 86a  
 Cretaceous outliers, Klamath region: Hershey,  
   02e  
 Crystalline schists, Coast Ranges: Becker, 91c  
 Cuyama Valley: English, 16  
 Death Valley: Campbell (M R), 02b, 03e  
 Del Norte Co.: Hershey, 11a  
 Devonian: Diller, 94b  
 Downieville quadrangle: Turner, 97  
 Eagle Mountains: Harder, 12  
 Eastern Cal.: Conkling, 78; Fairbanks, 96c;  
   Spurr, 03  
 Eldorado Co.: Bowman (A), 74; Fairbanks,  
   94b; Heydon, 97a  
 Eocene: Arnold, 14a  
   Coalinga-Cantua district: Taff, 13  
   San Pedro Point: Dickerson, 13b  
 Eocene history: Cooper (J G), 74c  
 Eocene horizons: Waring (C A), 14  
 El Paso Range and southern Sierra Nevada:  
   Baker (C L), 12  
 Etchegoin Pliocene, Coalinga region: Nomland,  
   17c  
 Fernando group, Newhall: English, 14  
 Foraminiferal strata: Ehrenberg, 70, 70a  
 Franciscan sandstone: Davis (E F), 18  
 Furnace Canyon: Keyes, 09f  
 General: Antisell, 56; Becker, 84b, 85a; Blake,  
   (W P), 55a, 56, 57, 66, 81b; Burkhart, 70a;  
   Fairbanks, 97d; Forstner, 09a; Frignet,  
   66; Guillemin-Tarayre, 71; Irelan, 90a,  
   93; Laur, 63; Marcou, 54b, 56, 66, 75c, 83,  
   83a; Newberry, 56; Tyson, 50; Whitney,  
   64a, 65, 69a, 80  
 Geologic formations: Smith (J P), 16  
 Geologic history: Smith (J P), 09, 10  
 Geological map: Smith (J P), 16a; Whitney, 73a  
 Glaucophane schists: Louderback, 06a  
 Gold belt: Storms, 03  
 Gold regions: Wilson (J S), 54  
 Gold-bearing rocks, age: Blake (W P), 68a;  
   Brewer, 66a, 68  
 Granites, Sierra Costa Mountains: Hershey, 00c  
 Granitic rocks, Sierra Nevada: Lindgren, 97d  
 Great Basin region: Turner, 01a; southern  
   part: Weeks, 03a  
 Humboldt Co.: Stalder, 15; Eel River valley  
   Harmon, 15  
 Inyo Co.: Waring (C A), 17b; geologic map:  
   Waring (C A), 17e  
 Inyo Range: Kirk, 18; Walcott, 97; and eastern  
   slope of southern Sierra Nevada: Knopf,  
   18  
 Ione formation, Cal.: Dickerson, 14g  
 Iron Mountain, Shasta Co.: Hershey, 15  
 Jackson quadrangle: Turner, 94  
 Jurassic strata: Dacqué, 11; Hyatt, 94a  
 Jurassic slates, Monterey Co.: Davis (C H), 13  
 Klamath Mountains: Anderson (F M), 02a;  
   Diller, 03d, 04a; Ferguson (H G), 15  
   granites, age: Hershey, 01b  
   structure: Hershey, 03a  
 Klamath region: Hershey, 06  
 Knoxville beds: Stanton, 95  
 Lake Mono region: Le Conte, 79



## California—Continued.

*Historical geology—Continued.*

- Lassen Peak district: Diller, 89, 95  
 Lava flood: Le Conte, 73a  
 Lavas, Sierra Nevada: Ransome, 98  
 Leona rhyolite: Clark (C W), 17  
 Livermore Valley: Branner, 12a, b, g  
 Los Angeles Co.: Preston (E B), 90; Watts, 97  
 McKittrick district: Gester, 17  
 McKittrick-Sunset district: Arnold, 10a; Johnson (H R), 09  
 Mariposa formation: Moody, 17  
 Martinez Eocene time, climatic zones: Dickerson, 17  
 Martinez formation: Dickerson, 11; Waring (C A), 17; and Tejon formation: Dickerson, 13c  
 Martinez group: Dickerson, 14a; Merriam, 97  
 Marysville Buttes: Dickerson, 17e  
 Marysville quadrangle: Lindgren, 95  
 Meganos group, Eocene: Clark (B L), 18  
 Metamorphic formations, northwestern Cal.: Hershey, 01a  
 Metamorphic series, Shasta Co.: Smith (J P), 94a  
 Mineral King district: Knopf, 05  
 Miocene, southern coast range region: Louderback, 12b  
 Miocene diabase, Santa Cruz Mountains, San Mateo Co.: Haebl, 04  
 Miocene history: Cooper (J G), 74b  
 Mohave Desert: Baker (C L), 11; Campbell (M R), 02b; Clark, 17a; Merriam, 15g  
 Mohave district: Bateson, 06  
 Mohave region formations, correlation: Merriam (J C), 13h  
 Mohawk Valley: Turner, 91a  
 Mono Co.: Eakle, 17b  
 Mono Valley, Quaternary history: Russell, 89  
 Monte Diablo coal field: Goodyear, 82  
 Monterey Co.: Fairbanks, 94c  
 Monterey quadrangle: Hawley, 17  
 Monterey series: Kew, 13; Louderback, 13; Martin (B), 12  
 Morro Hill, southern Cal.: Waring (G A), 17a  
 Mother Lode belt: Fairbanks, 90  
 Mother Lode district: Ransome, 00; Storms, 00  
 Mount Diablo Range: Anderson (F M), 05, 08; Louderback, 08a, 09a; Turner, 91  
 Mount Shasta: Diller, 15a  
 Neocene: Merriam, 98  
   Kern River: Anderson (F M), 11  
   Kirker Pass: Clark (B L), 12  
   Klamath region: Hershey, 02d  
   San Juan district: Anderson (F M), 14  
   San Luis Obispo Co.: Martin (B), 13  
   Sargent oil fields: Martin (B), 13a  
   Temblor Basin: Anderson (F M), 14  
 Nevada City area: Lindgren, 96  
 North Coalinga region: Merriam, 15b  
 Northeastern Cal.: Hill (J M), 15  
 Northern Cal.: Diller, 86, 94; Hall, 45; Trask, 56  
 Northern coast: Lawson, 94  
 Oil regions: Watts, 01  
 Oligocene: Clark (B L), 18a; Contra Costa hills: Clark (B L), 15a  
 Orindan and Siestan formations: Merriam (J C), 13d, 14c

## California—Continued.

*Historical geology—Continued.*

- Owens Valley, terrestrial deposits: Trowbridge, 11  
 Placer Co., Forest Hill Divide: Browne (R E), 90  
 Placerville quadrangle: Lindgren, 94  
 Pleistocene, Manix, Mohave Desert region: Buwalda, 14  
 Pliocene: Nomland, 17a  
   Jacalitos Creek: Nomland, 16b  
   middle and northern Cal.: Martin (B), 16  
   Riverside Co.: Vaughan (F E), 18  
 Pliocene and Pleistocene, southern Cal.: Arnold (D), 02  
 Pliocene history: Cooper (J G), 74a  
 Pliocene rivers: Bowman, 73  
 Plumas Co., lavas: Turner, 92a  
 Point Bonita, Marin Co.: Ransome, 93  
 Point Reyes Peninsula: Anderson (F M), 99  
 Post-Pliocene, Coast Range: Dall, 79  
 Potter Creek cave: Sinclair, 04a  
 Pyramid Peak district, Sierra Nevada: Lindgren, 96a, 97a  
 Quaternary, Rancho La Brea: Merriam, 11; southern Cal.: Hershey, 02f; Hilgard, 88  
 Quicksilver belt: Becker, 88  
 Redding quadrangle: Diller, 06  
 River beds, old: Le Conte, 80  
 Rock Creek area, Mohave Desert: Dickerson, 14c  
 Sacramento quadrangle: Lindgren, 94a  
 Salinas quadrangle: Hawley, 17  
 Salinas Valley: Nutter, 01  
 Salinas Valley-Parkfield district: English, 18  
 San Benito Co.: Bradley (W W), 17a; Fairbanks, 94c  
 San Bernardino Co.: Crossman, 90  
 San Clemente Island: Smith (W S T), 98  
 San Diego Co.: Hanks, 86  
 San Diego, Orange, and San Bernardino cos.: Fairbanks, 93b  
 Sandstone formation, San Francisco: Blake (W P), 56e  
 San Francisco, boring: Irelan, 90b  
 San Francisco district: Lawson, 14; Rath, 85j  
 San Francisco Peninsula: Fairbanks, 97a; Lawson, 95  
 San Joaquin Valley: Anderson (R), 12; Gester, 14; Mendenhall, 08b; Pack, 16; west border: Anderson (R), 15  
 San Jose and Mount Hamilton quadrangles: Templeton, 13  
 San Lorenzo series: Clark (B L), 18b  
 San Luis quadrangle: Fairbanks, 04  
 San Luis Obispo Co.: Antisell, 55; Fairbanks, 94c  
 San Nicolas Island, Ventura Co.: Bowers, 90  
 San Pablo formation: Buwalda, 13; Clark (B L), 13; Weaver, 08, 09  
 San Pablo Group: Clark (B L), 15  
 San Pedro: Arnold, 03  
 San Rafael Mountains, Santa Barbara Co.: Cooper (A S), 99a  
 Santa Ana Mountains: Dickerson, 14b  
 Santa Barbara Co.: Fairbanks, 94c; Watts, 97; Point Sal: Fairbanks, 96a  
 Santa Catalina Island: Smith (W S T), 97



## California—Continued.

*Historical geology—Continued.*

- Santa Clara Co.: Weber, 90  
 Santa Clara Valley: Crandall (P), 07; Eldridge, 07  
 Santa Cruz Island: Goodyear, 90  
 Santa Cruz Mountains: Ashley, 95; Neocene: Ashley, 96  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Inez Mountains, Santa Barbara Co.: Hawley, 18  
 Santa Lucia Mountains: Davis (C H), 13  
 Santa Lucia range, San Luis Obispo Co.: Fairbanks, 96b  
 Santa Margarita beds, North Coalinga region: Nomland, 17b  
 Santa Maria district: Arnold, 07d, f, h  
 Santa Susanna district: Johnson (H R), 13; Waring (C A), 1;  
 Santa Ynez River district, Santa Barbara Co.: Kew, 15  
 Sargent oil field: Jones (W F), 11  
 Shasta Co.: Fairbanks, 93, 94e  
   Carboniferous: Smith (J P), 94d  
   Triassic and Jurassic: Smith (J P), 94c  
 Shasta group: White (C A), 85  
 Shasta region: Smith (J P), 95b  
 Shasta-Chico series: Diller, 94a  
 Sierra Costa Mountains: Hershey, 00  
 Sierra Madre: Claypole, 01a  
 Sierra Nevada: Bowman (A), 75; Mills (J E), 92; Reyer, 86; Trask, 53, 53a, 54, 55a; Turner, 94a, c, 96  
   bedrock complex: Louderback, 13b  
   igneous rocks, succession: Turner, 98e  
   south of Mt. Whitney: Goodyear, 73a  
   southern, structure: Buwalda, 15  
   structure: Becker, 91  
 Sierran: Hershey, 02  
 Slate's Springs region: Fairbanks, 96f  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora quadrangle: Turner, 97a  
 Southeastern Cal.: Darton, 16c; Loew, 76  
 Southern Cal.: Blake (W P), 56a; Marcou, 76; Newberry, 61; Trask, 56; crystalline rocks: Hershey 02a  
 Strata with Jurassic flora: Diller, 08  
 Summerland oil district: Arnold, 07e  
 Sunol Valley: Branner, 12b  
 Taylorville region: Diller, 92, 08b; Jurassic and Triassic: Hyatt, 92  
 Tehachapi region, Miocene: Buwalda 16  
 Tehama Co.: Fairbanks, 93a  
 Tejon group: Dickerson, 14, 15, 16, 16a, 18b  
   age: Cooper (J G), 74c; Heilprin, 82d  
   Eocene age: Harris, 93b  
   San Diego Co.: Dickerson, 16b  
 Tejon Hills: Merriam, 15e  
 Temescal district: Fairbanks, 97c  
 Tertiary: Arnold, 09a, b; Blake (W P), 55; Conrad, 55e; Cooper (J G), 74d; Jackson, 66c  
   Coalinga oil field: Dumble, 12  
   correlation, southern Cal.: Merriam, 15h  
   Monterey: Blake (W P), 55e  
   northern Cal.: Diller, 93  
   southern Cal.: Hershey, 02b

## California—Continued.

*Historical geology—Continued.*

- Tertiary and Pleistocene formations: Arnold, 06  
 Tertiary gravels of Sierra Nevada: Lindgren, 11  
 Triassic: Smith (J P), 04a  
   geographic relations: Smith (J P), 98  
   northern Cal.: Merriam, 02  
   Shasta Co. section: Smith (J P), 12a  
   western America: Smith (J P), 07  
 Truckee quadrangle: Lindgren, 97  
 Tuolumne Table Mountain: Locke, 12b  
 Unconformity in Coalinga field: Ruckman, 13  
 Upper Kern Basin: Lawson, 04  
 Vaqueros formation: Loel, 18  
 Ventura Co.: Fairbanks, 94c; Gale, 14e; Watts, 97  
 Wallala beds: Fairbanks, 93d  
 Waltham, Priest, Bitterwater and Peachtree valleys: Pack, 14b  
 Weaverville quadrangle: Ferguson (H G), 14  
 Yosemite quadrangle: Turner, 03  
 Yosemite Valley: Whitney, 68b

*Mineralogy.*

- Albite, manganiferous: Kraus, 15  
 Allanite, Yosemite Valley: Ries, 00e  
 Alunite: Wherry, 16a  
 Amphibole, Berkeley: Palache, 94a  
 Amphiboles, classification: Murgoci, 06a  
 Aragoite: Durand, 73a; Hanks, 05  
 Awaruite, Smith River: Jamieson, 05  
 Axinite: Schaller, 10e  
 Bakerite, San Bernardino Co.: Giles, 03  
 Bakerite and howlite: Giles, 03  
 Benitoite: Arnold, 08b; Baumhauer, 09; Hlawatsch, 09-09b; Louderback, 07, 09; Rogers (A F), 08a; composition: Kraus, 08; paragenesis and occurrence: Louderback, 09  
 Benitoite and neptunite: Wilke, 08  
 Bernardinite, San Bernardino Co.: Stillman, 79, 80  
 Beryl, San Diego Co.: Ford (W E), 10  
 Bismuth and bismite, Pala: Kunz, 03b  
 Bismuth ochers, San Diego Co.: Schaller, 11b  
 Black sands: Silliman (jr), 73  
 Bloedite crystals: Schaller, 13  
 Bodie: Turner, 08  
 Borax Lake, San Bernardino Co.: Pratt, 96  
 Brookite, octahedrite, and quartz: Kunz, 93a  
 Calaita (turquoise) pseudomorph after apatite: Moore (G E), 85  
 Calaverite, Calaveras Co.: Penfield, 01a  
 Calcite crystals: Schaller, 08a  
 Californite: Clarke (F W), 05; (vesuvianite), Siskiyou Co.: Kunz, 03a  
 Cassiterite, San Diego Co.: Schaller, 16  
 Catalog of minerals: Blake (W P), 66; Hanks, 86  
 Chlorite, chromiferous, Green Valley: Lindgren, 88  
 Chromite, Monterey Co.: Goldsmith, 74  
 Chrysocolla, Boleo: Jannettaz, 86  
 Cinnabar, Sonoma Co.: Sachs, 07  
 Colemanite: Eakle, 02; Evans (J T), 84, 85; Jackson (A W), 84, 85; Rath, 84b, 85a; Death Valley: Bodewig, 85; Hiortdahl, 85; Whitfield (J E), 87a



## California—Continued.

*Mineralogy*—Continued.

- Colorado Desert: Orcutt, 90  
 Colusa Co.: Fairbanks, 94d  
 Covellite, Calaveras Co.: Rogers (A F), 11  
 Crestmore, Riverside Co.: Eakle, 14b, 17  
 Cristobalite: Rogers (A F), 18  
 Cuproscheelite, Kern Co.: Hanks, 73  
 Cuprodesclousite: Schaller, 11h, 12  
 Diamonds: Silliman (jr), 67b; Turner, 99b  
 Durdenite, Calaveras Co.: Larsen, 17i  
 Eakleite, St. Inez: Larsen, 17  
 Eglestonite, San Mateo: Rogers (A F), 11a  
 Enargite, Alpine Co.: Root, 68a  
 Erythrite, Los Angeles Co.: Blake (W P), 85b  
 Gaylussite, San Bernardino Co.: Hanks, 92  
 Gem minerals, southern Cal.: Kunz, 04  
 General: Blake, 66, 81b; Conkling, 78a; Genth, 52; Hanks, 84, 86; Turner, 98c; Whitney, 68c  
 Glauberite, Borax Lake: Silliman (jr), 68b  
 Gold: Blake (W P), 84; Dana (E S), 86b; crystallized: Alger, 50, 50a  
 Griffithite: Larsen, 17a  
 Gyrolite, New Almaden: Clarke (F W), 89c  
 Hanksite: Dana, 85b; San Bernardino Co.: Hanks, 89; Hidden, 85a; Rath, 87c  
 Howlite, San Bernardino Co.: Giles, 03  
 Hydrogiobertite: Wells, 10b  
 Ilvaite, Shasta Co.: Prescott, 08  
 Labradorite, aventurine, Modoc Co.: Andersen, 17  
 Lawsonite: Ransome, 96; Schaller, 05; Marin Co.: Rogers (A F) 15; Schaller, 04a; Tiburon Peninsula: Ransom, 95  
 Lawsonite, columbite, beryl, calcite, notes on: Eakle, 07  
 Lepidolite, San Diego Co.: Schaller, 05c; southern Cal.: Fairbanks, 93f  
 Leona Heights, Alameda Co.: Schaller, 03  
 Luminescent zinc blende, Mariposa Co.: Eakle, 04b  
 Manganese phosphates from gem tourmaline field: Schaller, 12b  
 Melanterite: Friedrich, 88  
 Meteorites: Whitney, 66d  
 Canyon City, Trinity Co.: Shepard, 85; Ward (H A), 04  
 Eldorado Co.: Shepard, 72  
 Ivanpah, San Bernardino Co.: Cohen 91, 92; Shepard, 80  
 Los Angeles: Jackson, 72a  
 San Emigdio Range, San Bernardino Co.: Merrill (G P), 88b, 89a  
 Shingle Springs, El Dorado Co.: Cohen, 92; Silliman (jr), 73a  
 Massicot, San Bernardino Co.: Larsen, 17f  
 Metacinnabarite, New Almaden: Melville, 90a  
 Minerals from pegmatite veins of Rincon, San Diego Co.: Rogers (A F), 10b  
 Mother vein: Silliman (jr), 68a  
 Mountain soap: Koenig, 79  
 Natrolite and neptunite, San Benito: Hlawatsch, 09c  
 Neocolemanite: Eakle, 11  
 Northupite, Borax Lake: Foote (W M), 95a

## California—Continued.

*Mineralogy*—Continued.

- Neptunite, San Benito Co.: Bradley, 09; Ford (W E), 09  
 Notes on minerals: Eakle, 08a  
 Palacheite, Knoxville: Eakle, 03, 03a  
 Paragenesis in glaucophane-bearing rocks: Smith (J P), 06  
 Partzite: Arents, 67; Mono Co.; Blake (W P), 67c  
 Periclase, Riverside: Rogers (A F), 18  
 Picotite, Mt. Shasta: Wadsworth, 82e  
 Phosphorescent zinc blende: Headden, 06  
 Placerville, Eldorado Co.: Kunz, 92a  
 Quartz, Lake Co.: Durand, 73; San Diego Co.: Waring, 05a  
 Quicksilver deposits: Melville, 90  
 Rare minerals: Rogers (A F), 12f  
 Roscoelite: Hillebrand, 99b; Turner, 99d; Eldorado Co.: Blake (J), 76, 76a  
 Rubellite, southern Cal.: Fairbanks, 93f  
 Ruby corundum, San Bernardino Co.: Louderback, 10c  
 San Diego Co.: Sovereign, 05a  
 Searlesite: Larsen, 14  
 Sonoma Co.: Goldsmith, 77  
 Sphalerite, phosphorescent, Mariposa Co.: Eakle, 04a  
 Sphene in granite of Sierra Nevada: Blake (W P), 66c  
 Spodumene, San Diego Co.: Kunz, 03; Schaller, 03a  
 Stibioferrite, Santa Clara Co.: Goldsmith, 74a  
 Stibiotantalite, San Diego Co.: Penfield, 05a  
 Sulphohalite, Borax Lake: Hidden, 88d; San Bernardino Co.: Hidden, 88c; Penfield, 00b  
 Sulpholite, Searles Lake: Gale, 14h  
 Sundry minerals: Blake (W P), 67; Blasdale, 01; Eakle, 01, 14; Jackson (A W), 86; Schaller, 04; Silliman (jr), 73b  
 Telluret of silver: Blake (W P), 57b  
 Tellurium minerals: Silliman (jr), 68a  
 Thenardite, San Bernardino Co.: Ayres, 89  
 Thinolite: Russel, 89  
 Tourmaline: Orcutt, 98; Schaller, 12e; San Diego Co.: Sterrett, 04; southern Cal.: Schaller, 04b  
 Trautwineite: Goldsmith, 73  
 Trona, San Bernardino Co.: Ayres, 89a  
 Tychite, Borax Lake: Penfield, 05a  
 Ulexite, Lang: Foshag, 18  
 Uwarowite, Green Valley: Lindgren, 88  
 Vesuvianite: Clarke (F W), 05  
 Voelckerite, Santa Clara Co.: Rogers (A F), 14d  
 Wilkeite and okenite: Eakle, 14a  
 Xanthophyllite, Crestmore: Eakle, 16  
*Paleontology.*  
 Actaeon, San Diego: Stearns, 97, 98  
 Alabina: Bartsch, 11  
 Alvania, San Pedro: Bartsch, 11d  
 American River: Blake (W P), 64c  
 Ammonites, Shasta Co.: Trask, 55b; Tejon: Heilprin, 82a; Newberry, 82d  
 Arcas, Neocene: Osmont, 05a  
 Aucella: White (C A), 88  
 Auk, Los Angeles: Lucas (F A), 01d



## California—Continued.

*Paleontology—Continued.*

- Aulisci: Deby, 93  
 Auriferous gravels, Sierra Nevada: Whitney, 80  
 Auriferous slate fossils: Blake (W P), 64d, 66f, 67e; Brewer, 66c; Meek, 65; Mariposa: Gabb, 64c  
 Avian paleontology: Miller (L H), 12  
 Avifauna of Pleistocene cave deposits: Miller (L H), 11b  
 Bathytoma, Pleistocene, San Pedro: Rivers, 13  
 Bautista Creek fauna: Frick, 18  
 Beaver, Fresno Co.: Kellogg, 11  
 Birds, Pleistocene, San Pedro: Miller (L H), 14  
 Bison antiquus: Chandler, 16a; Leidy, 67  
 Bittium: Bartsch, 11c; San Pedro: Dall, 01d  
 Brittle star, Miocene, Santa Cruz Mountains: Arnold, 08e  
 Canidae, Pliocene and Quaternary: Merriam, 03a  
 Capromeryx, Rancho La Brea: Chandler, 16  
 Carboniferous: Meek, 64  
 Carinifex, Santa Clara lake beds; Hannibal, 09  
 Carrizo Creek fauna: Dickerson, 18; corals: Vaughan, 17  
 Caryophyllia: Vaughan, 00c  
 Cat allied to Felis atrox: Merriam, 09  
 Catalog of fossils: Cooper (J G), 71, 88, 94  
 Cave bear: Cope, 79q, 91g  
 Cenozoic: White (C A), 85  
 Cephalopoda, Tertiary: Trask, 56b  
 Cerithiopsis: Bartsch, 11b  
 Cestraciont shark, Triassic: Bryant (H C), 14; Wemple, 06  
 Cetacea: Leidy, 68e  
 Chanac mammalian fauna: Merriam, 16c  
 Check list of Carboniferous, Triassic, Jurassic, and Cretaceous fossils: Gabb, 65  
 Chico fauna: Stanton, 93a  
 Cirripede, Miocene: Conrad, 77a  
 Coalinga region faunas: Arnold, 09, 09a, 10; Nomland, 16a  
 Colorado Desert, freshwater shells: Stearns, 01  
 Coniferous wood: Ford (H C), 90  
 Corals: Nomland, 17; Cretaceous and Tertiary: Nomland, 16  
 Crabs: Rathbun, 08; Pliocene: Rathbun, 17a  
 Cretaceous: Anderson (F M), 02; Gabb, 64a, 67, 69; White (C A), 85b; Santa Ana Mountains: Packard (E L), 16  
 Cretaceous and Tertiary, Santa Cruz Mountains: Arnold, 08d  
 Cupressinoxylon, Calistoga: Conwentz, 78  
 Deadmans Island, molluscan faunas: Oldroyd, 16  
 Desmostylus: Merriam, 11e  
 Diastoma: Bartsch, 11a  
 Diatomaceae: Bailey (J W), 54, 54a, 55a; Edwards (A M), 93b; Santa Monica: Hyde, 93; Schultze, 97  
 Dolphin, San Luis Obispo.: Lull, 14  
 Echinoidea, Contra Costa Co.: Rémond, 63b  
 Neocene: Merriam, 98  
 San Pablo group: Kew, 15  
 Tertiary: Kew, 17; Merriam, 99; Pack, 09; Weaver, 08

## California—Continued.

*Paleontology—Continued.*

- Elephant, Alameda Co.: Hovey, 74  
 Elephant teeth: Blake (W P), 67g  
 Elotherium: Leidy, 68a  
 Eocene and Cretaceous: Stanton, 96  
 Eocene fauna, Marysville Buttes: Dickerson, 13  
 Eocene Mollusca: Waring (C A), 14  
 Equidae: Leidy, 68d  
 Etchegoin Pliocene, Coalinga region: Nomland, 17c  
 Euceratherium, Quaternary caves: Sinclair, 04  
 Evesthes jordani, flounder, Miocene: Gilbert (J Z), 10a  
 Faunal zones, Tejon group: Dickerson, 14  
 Fernando fauna, Los Angeles: Moody, 16, 17a  
 Fernando group, Newhall: English, 14  
 Flora of auriferous gravels: Knowlton, 11  
 Foraminifera, post-Pliocene, Santa Barbara: Bagg, 05c; Woodward (A), 89; Tertiary: Chapman (F), 00  
 Fossil trees: Lakes, 95b  
 Gastropoda, Tertiary: English, 14a  
 General: Yates, 02  
 Ground sloth, Quaternary: Merriam, 00  
 Hipparion group: Merriam, 15c  
 Horn from Mohave Miocene: Merriam (J C), 13b  
 Horses: Leidy, 65d; Miocene and Pliocene: Merriam, 15d; Rancho Le Brea: Merriam, 13e  
 Human remains in caves: Merriam, 09b  
 Ichthyopterygia, Triassic: Merriam, 02  
 Ichthyosauria, Triassic: Merriam, 03  
 Invertebrata: White (C A), 89a  
 Jurassic: Meek, 64a; Slate's Springs: Davis (C H), 13  
 Knoxville fauna: Stanton, 95  
 Land shells: Cooper (J G), 87  
 Limnaeid, post-Pliocene: Call, 88  
 Lyropecten, Eel River: Dall, 01b  
 Machaerodus, Kern Co.: Merriam, 05a  
 Mactrinae, Mesozoic and Cenozoic, Pacific coast: Packard (E L), 16a  
 Mammalia: Leidy, 71a, 73f; Yates, 74  
 Miocene, Tehachapi Pass: Buwalda, 16  
 Mohave Desert: Merriam, 11b  
 Quaternary: Furlong, 06, 07; Merriam, 06a, d; Sinclair, 05a  
 Table Mountain: Leidy, 70t  
 Tejon Hills: Merriam, 15e  
 Mammoth and mastodon: Blake (W P), 55b  
 Mancalla, Miocene auk: Lucas (F A), 01c  
 Martinez fauna, Eocene: Dickerson, 14a, c, d; Waring (C A), 17; Weaver, 05  
 Mastodon: Leidy, 71h; Silliman (jr), 68; Stanislaus Co.: Leidy, 70m  
 Mesozoic faunas: Smith (J P), 95; White (C A), 85  
 Mesozoic Mollusca: Gabb, 69a  
 Mesozoic plants, Oroville: Fontaine, 00a  
 Miocene: Merriam, 04; San Luis Obispo: Gabb, 64d  
 Miocene invertebrates: Smith, 12b  
 Mohave Desert: Merriam, 15g  
 Mollusca: Conrad, 53c, 55, 56, 56a, 57, 65j, 66d; Gabb, 66  
 Cretaceous: Cooper (J G), 97  
 Cretaceous and Tertiary, San Jose region: Hall (E B), 16



## California—Continued.

*Paleontology*—Continued.

- Mollusca: Los Angeles tunnel clays: Stearns, 00a  
 Santa Monica Range: Rivers, 04  
 Monterey Foraminifera: Bagg, 05  
 Monterey series, Martin (B), 12; *Scutella breweriana* zone fauna: Clark (B L), 14  
 Mount Diablo Range: Anderson (F M), 05  
 Nectosaurus, osteology: Merriam (J C), 08a  
 Neocene, San Juan district: Anderson (F M), 14; Temblor Basin: Anderson (F M), 14  
 Neocene man, Sierra Nevada: Sinclair, 03  
 Neocene Mollusca: Martin (B), 14  
 North Coalinga region, vertebrates: Merriam, 15b  
 Nothrotherium: Stock, 17d; and *Megalonyx*: Pleistocene: Stock, 13  
 Oil-bearing formations: Arnold, 07, 07b  
 Orindan and Siestan faunas: Merriam (J C), 13d, 14c  
 Ostracoda, Pliocene: Chapman (F), 96  
 Ostrea, Miocene: Conrad, 52a; Monterey series: Cruess, 14.  
 Pandora, Santa Monica: Rivers, 02  
 Pectens, Tertiary and Pleistocene: Arnold, 06  
 Pelecypoda, Tertiary, Contra Costa Co.: Rémond, 63  
 Pinole tuff fauna: Merriam, 17d  
 Pisces: Agassiz (L), 55, 57; Jordan, 07, 13  
 Plagiostoma, Los Angeles: Trask, 56c  
 Plantae, auriferous gravel deposits: Lesquereux, 78c  
 Colorado Desert: Schaeffer, 57  
 Oroville: Fontaine, 96a  
 Posuncula River: Bailey (J W), 55, 57  
 Pleistocene fauna, Hawver cave: Stock, 14b, 16, 18; Sta. Barbara: Carpenter (P P), 66  
 Pleistocene rodents: Kellogg, 12  
 Pleistocene shells: Oldroyd, 14  
 Pleurotoma, Pliocene, Santa Monica: Raymond (W J), 04  
 Pleurotomidae: Buell, 11  
 Pliocene and Pleistocene Foraminifera: Bagg, 12  
 Pliocene faunas: Merriam, 17a; Nomland, 17a  
 Jacalitos Creek: Nomland, 16b  
 middle and northern Cal.: Martin (B), 16  
 Riverside Co.: Vaughan (F E), 18  
 Pliocene flora from Coast Ranges: Hannibal, 11  
 Pliocene fresh-water Mollusca: Cooper (J G), 94a  
 Plihippus: Merriam, 16a  
 Post-Pliocene, Coast Range: Dall, 79  
 Potter Creek cave, Shasta Co.: Sinclair, 03b, c, 04a  
 Prehistoric man: Wright (G F), 08a  
 Preptoceras, Samwel Cave: Furlong, 05  
 Productus giganteus: White (C A), 81a  
 Protozoa: Friedrich, 89c  
 Quaternary cave fauna: Furlong, 06, 07  
 Quaternary Felidae: Bovard, 07  
 Quaternary myriapods and insects: Grinnell 08  
 Raccoon, Pleistocene: Gidley, 06b  
 Radiolarian chert, Angel Island: Hinde, 94  
 Rancho la Brea fossils: Denton, 76; Gilbert (J Z), 10; Matthew (W D), 16c; Merriam, 08, 09c, 11, 13; Stoner, 13; Wyman, 18

## California—Continued.

*Paleontology*—Continued.

- Rancho la Brea fossils: antelopes: Chandler, 14; Taylor (W P), 11  
 bear: Merriam (J C), 11a  
 bison: Chandler, 16b  
 Bufo: Camp, 17  
 camel: Merriam (J C), 13a  
 Canidae: Merriam (J C), 12  
 Cani dirus: Matthew (W D), 16a  
 Carnivora: Merriam (J C), 12a  
 condor-like vultures: Miller (L H), 10a  
 conifers: Knowlton, 16f  
 eagle tarsi: Miller (L H), 11a  
 horses: Merriam, (J C), 13c  
 human remains: Merriam (J C), 14a  
 Felidae: Merriam (J C), 17c  
 Felis daggetti: Merriam (J C), 18c  
 Mammalia: Merriam (J C), 10a  
 mylodont sloths: Stock, 14, 14a, 17a, b  
 Nothrotherium: Stock, 17  
 owl remains: Miller (L H), 16a  
 Paramylodon: Sinclair, 10  
 Pavo californicus: Miller (L H), 09, 16  
 Teratornis: Miller (L H), 09a  
 vulturid raptors: Miller (L H), 16b  
 wading birds: Miller (L H), 10  
 Reptilia, Triassic: Merriam (J C), 95  
 Rissoina: Bartsch, 15  
 Rodeo Pleistocene fauna: Merriam (J C), 16e  
 Samwel cave, Shasta Co.: Furlong, 04  
 San Pablo fauna: Clark (B L), 14a, 15  
 San Pedro: Arnold, 03  
 Santa Cruz Mountains, Neocene: Ashley, 96  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Margarita beds, North Coalinga region: Nomland, 17b  
 Scutella: Rémond, 63a  
 Scutella norrisi and Scutaster andersoni: Pack, 13  
 Sebastodes, Tertiary, Port Harford: Eigenmann, 90  
 Sequoia, Sierra Nevada: Jeffrey, 04  
 Sharks: Jordan, 13  
 Shasta fauna: Stanton, 93a  
 Sigmogomphius, rodent, Berkeley: Merriam, 96  
 Sirenian: Marsh, 88a  
 Tapir: Blake (W P), 68b; Cenozoic: Merriam (J C), 13  
 Tejon fauna: Dickerson, 15, 16, 16a, b; Heilprin, 82d  
 Tejon Hills, marine Tertiary faunas: Clark (B L), 16  
 Tephrocyon: Merriam (J C), 13c  
 Tertiary: Conrad, 56b; Gabb, 69  
 coral reef: Vaughan, 04  
 echinoids, Carrizo Creek region, Colorado Desert: Kew, 14  
 fossil forest: Marsh, 71a  
 fresh-water Mollusca: Hannibal, 12  
 Gastropoda: Stearns, 76  
 Mohave Desert: Merriam (J C), 13f, g  
 Mollusca: Arnold, 07; Dall, 74, 79a, b; Santa Barbara Co.: Arnold, 08  
 San Diego: Orcutt, 89a, b  
 Thalottosaurus, skull: Merriam, 16g; Triassic: Merriam, 04a, 05b, e



## California—Continued.

*Paleontology*—Continued.

- Tooth, Table Mountain: Blake (W P), 70a  
 Tortoise, auriferous gravels: Sinclair, 03  
 Triassic: Gabb, 64; Smith (J P), 04a, 14; ichthyosaurs: Merriam, 03c  
 Tropitidae, Triassic: Smith (J P), 18  
 Vertebrates, Hosselkus limestone: Bryant (H C), 14a; Mare Island, San Francisco Bay: Blake (W P), 64a  
 Whale (Eschrichtus): Cope, 72k  
 Whales, ancestors of: Gilbert (J Z), 08  
 Woods, silicified: Friedrich, 89; Phillips (J A), 73; Platen, 08

*Petrology*.

- Amphibole rock, Berkeley: Palache, 94a  
 Amphibole pyroxene rock: Turner, 97c  
 Analcite diabase, San Luis Obispo Co.: Fairbanks, 95  
 Andalusite mass, Inyo Range: Knopf, 17a  
 Archean gneiss, Sierra Nevada: Turner, 96  
 Berkeley Hills: Lawson, 02  
 Bodie: Turner, 08  
 Bully Hill district: Boyle, 14  
 Calcite-brucite rocks, origin: Rogers (A F), 18  
 Carmelo Bay: Lawson, 93d  
 Coast Ranges: Turner, 98b; north of San Francisco: Osmont, 05  
 Copper deposits, Plumas Co.: Turner, 14  
 Crestmore, Riverside Co.: Eakle, 17  
 Cretaceous metamorphic rocks: Becker, 86a  
 Crocidolite-bearing rocks: Louderback, 08b  
 Crystalline rocks, northern Cal.: Dutton, 91  
 Crystalline schists, Coast Ranges: Becker, 91c  
 Diorite, Placer Co.: Reinhold, 82a  
 Eclogites: Holway, 04  
 Epidote, pyrogenetic: Butler, 09a  
 Feldspar corundum rock, Plumas Co.: Lawson, 01b  
 Franciscan sandstone: Davis (E F), 18  
 Gabbro, orbicular, Dehesa: Kessler, 04; San Diego Co.: Lawson, 04a  
 General: Conkling, 78a; Richthofen, 68a; Turner, 98c  
 Glaucophanes schists: Louderback, 06a; Nutter, 02; Washington, 01a  
 Glaucophanes-bearing rocks: Smith (J P), 06  
 Granites, Sierra Costa Mountains: Hershey, 00c  
 Grass Valley: Lindgren, 96b  
 Hornblende basalt, northern Cal.: Diller, 97a  
 Igneous rocks, Sierra Nevada: Turner, 95  
 Lava, Lassen Peak region: Diller, 84b, 87b; Sierra Nevada: Ransome, 98  
 Leona rhyolite: Clark (C W), 17  
 Lherzolite serpentine, Potrero San Francisco: Palache, 94  
 Lithophysae in obsidian from Little Lake Wright (F E), 16b  
 Magnetic rocks: Hanks, 90  
 Mineral King district: Knopf, 05  
 Miocene diabase, Santa Cruz Mountains, San Mateo Co.: Haehl, 04  
 Mojave district: Bateson, 06  
 Mount Diablo: Melville, 91  
 Mount Shasta: Diller, 84b  
 Napa and Lake cos.: Rath, 85h  
 Nevada City: Lindgren, 96b

## California—Continued.

*Petrology*—Continued.

- Oak Hill crystalline rocks: Carey, 07  
 Orbicular rocks: Turner, 97c  
 Pajaro: Reid (J A), 02  
 Pegmatite veins, Pala, San Diego Co.: Waring (G A), 05  
 Pegmatites from southern Cal.: Schaller, 10f  
 Point Bonita, Marin Co., eruptive rocks: Ransome, 93  
 Point Reyes Peninsula: Anderson (F M), 99  
 Plumas Co., lavas: Turner, 92a  
 Plumasite, Spanish Peak: Lawson, 03  
 Pyramid Peak district, Sierra Nevada: Lindgren, 97a  
 Redding quadrangle: Diller, 06  
 Radiolarian chert, Angel Island: Hinde, 94  
 Franciscan group: Davis (E F), 18a  
 San Clemente Island: Smith (W S T), 98  
 San Francisco Peninsula: Crandall (R), 07a  
 San Gabriel Mountains: Arnold, 05  
 Santa Barbara Co., Point Sal: Fairbanks, 96a  
 Santa Catalina Island: Smith (W S T), 97  
 Santa Cruz Mountains, Neocene: Ashley, 96  
 Serpentine, alteration of: Knopf, 06a  
 Serpentine, Coast Ranges: Kramm, 10; Wadsworth, 92a  
 Sierra Nevada: Schuster, 87; Turner, 94c, 96, 99c; granitic rocks: Turner, 99; igneous rocks, succession: Turner, 98e  
 Soda rhyolite north of Berkeley: Palache, 93  
 Spherulites, Little Lake: Wright (F E), 16b  
 in obsidian, Hot Springs: Rutley, 90  
 Syenitic rocks: Turner, 96a  
 Trachytic perlite, Lone Hill, San Jose: Postma, 13  
 United States-Mexico boundary: Lord, 99  
 Upper Kern Basin: Lawson, 04  
 Variability in rock magma: Turner, 02c  
 Volcanic dust, Great Basin: Russell, 85c
- Physical geology*.
- Basin-range structure, Death Valley: Campbell (M R), 03c  
 California fault line, erosion: Holway, 14b  
 Changes of level: Wittich (E), 12  
 Coast erosion: Wilson (M E), 07  
 Coast Range: Le Conte, 76  
 Conglomerate, in process of formation: Arnold, 08h  
 Contact metamorphism, El Paso Range: Fairbanks, 97b  
 Corrasion, subterranean, Tuolumne Co.: Storms, 99e  
 Del Mar pyramids: Holder, 01a  
 Diastrophism, post-Pliocene, southern coast: Lawson, 93e  
 Dome structure, in conglomerate: Arnold, 07a, 08a; Sierra Nevada: Gilbert, 04d  
 Drainage changes, Santa Clara Valley: Braner, 07  
 Earthquake lines: Storms, 06  
 Earthquake rift in eastern San Luis Obispo Co.: Arnold, 09c  
 Earthquake rift of 1906: Jordan, 06  
 Earthquakes: Blake (J), 70; Blake (W P), 54b, 56; Holden, 87; Mulholland, 18; Shaler, 70d; Trask, 56a; Wood (H O), 16a



## California—Continued.

*Physical geology—Continued.*

- Earthquakes: After-shocks: Kiess, 12  
 Imperial Valley, June 22, 1915: Beal, 15a  
 July 1, 1911: Templeton, 11; Anon, 11c; region of origin: Wood, 12c  
 Kern River: Clayton, 70  
 Los Alamos, Santa Barbara Co.: Beal, 15  
 Owens Valley: Hobbs, 10f; Rockwood, 72a; Whitney, 72b; 1872: Johnson (W D), 08  
 Pacific coast, catalog, 1897-1906: McAdie, 07; 1769-1897: Holden, 98  
 registration at Berkeley: Davis (E F), 13; Wood (H O), 12, 12a, b  
 San Bruno earthquake, 1914: Davis (E F), 14  
 San Francisco, 1906: Aitken, 06; Arnold, 07i; Böse, 11 Bogdanovich, 09; Branner, 11a; Campbell (W W), 06; Carey, 03; Crandall, 07a; Davidson (G), 06, 06a; Davison, (C), 06; Fairbanks, 07; Fuller, 06j; Gilbert, 06d, 07a, 09; Haehl, 07; Harper, 03; Hobbs, 08; Hovey, 09a; Jordan, 07a; Klautsch, 09; Kunz, 08; Lawson, 06c, 08; Leuschner, 06; Omori, 06, 06a, 07, 07a, b; Redway, 07; Reid (H F), 10, 10a; Richter, 07; Rickard, 06; Ritter, 06a; See, 06; Taber (S), 06; Tyler, 06; U S G S, 07; Upham, 07a; Wolff, 08; Anon, 06  
 cause: Böse, 11; Branner, 06b, c; Cooper, (A S), 06; Gilbert, 06e; Hixon, 06; Ingalls (A O), 06; Jordan, 06; Kunz, 08; Matamoros, 08; Ransome, 06; Reid (H F), 09b; Rothpletz, 10; See, 06a; Spencer (A C), 06; Storms, 06  
 duration of first tremor: Oldham, 08  
 earth flows: Anderson (R), 07, 08  
 earth movements: Branner, 06c; Fairbanks, 07; Hayford, 07a; Oldham, 09; Omori, 07d  
 effects: Taber (S), 06  
 faulting: Omori, 07d  
 geodetic study: Hayford, 09a  
 geological prelude: Ashley, 06d  
 history: Aitken, 06  
 intensity, compared with New Madrid and Charleston earthquakes: Fuller, 06  
 investigation: Gilbert, 06d; Lawson, 06c  
 magnetograph records: Bauer, 06, 06a  
 mechanics of: Reid (H F), 08a  
 movement along the Santa Cruz fault line: Branner, 06c  
 seismographs: Bauer, 06a, 06b  
 Catania, Italy: Ricco, 06  
 Japan: Omori, 06, 07b  
 Washington: Marvin, 06  
 San Francisco, October 8, 1865: Blake (W P), 66a  
 San Jacinto earthquake: Claypole, 00; Daneš, 07; April 21, 1918: Rolfe, 18; Townley, 18; aftershocks: Hamlin, 18a  
 Santa Barbara Channel earthquakes: Mattei, 17  
 Santa Cruz Mountains, 1914: Beal, 14  
 southern and eastern Cal.: Hamlin, 17  
 southern Cal.: Hamlin, 18; Wood (H O), 18  
 synthetic study of: Wood (H O), 10  
 Tejon Pass earthquake, 1916: Branner, 17a

## California—Continued.

*Physical geology—Continued.*

- Earthquakes: Yosemite Valley, 1872: Muir, 72  
 1800-64: Trask, 64a  
 1856: Trask, 57  
 1857: Trask, 58  
 1857, January 9: Trask, 57a  
 1858-9: Trask, 60  
 1860: Trask, 63  
 1863: Trask, 64  
 1864: Trask, 66  
 1865: Trask, 66a  
 1888: Holden, 89  
 1889: Keeler, 90  
 1890 and 1891: Holden,  
 1892: Perrine, 93  
 1893: Perrine, 93a  
 1894: Perrine, 95  
 1895: Perrine, 96  
 1896 and 1897: Perrine, 98  
 1898: Leuschner, 98; Perrine, 99  
 1914, Nov. 8, central Cal.: Davis (E F), 15  
 1915: Palmer (A H), 16; October 7: Davis (E F), 15a  
 1916: Palmer (A H), 17  
 1917: Palmer (A H), 18  
 Erosion of mountains, southern Cal.: Wright (F B), 00  
 Fault lines in the Santa Cruz Mountains: Branner, 06b  
 Fault system, San Jacinto region: Arnold, 18; Siskiyou Co.: Gunther, 05a  
 Faulting, Owens Valley: Johnson (W D), 10; Sierra Nevada: Russell, 87  
 Folded vein, Banner district, San Diego Co.: Fairbanks, 94f  
 Foraminiferal strata: Ehrenberg, 70, 70a  
 Franciscan sandstone, origin: Davis (E F), 18  
 Geysers: Goodale, 67  
 Glacial erosion: Blake (W P), 00  
 Glacial potholes: Turner, 92  
 Glaciers: Rabot, 09  
 Gravitational assemblage in Sierra Nevada granite: Gilbert, 06b  
 Heave-fault slipping, Coast Range: Wood (H O), 15a  
 Imperial Valley: Beal, 15a  
 Infusorial rocks: Whitney, 67d  
 Inyo Co., folding: Walcott, 95c  
 Inyo Range, post-Pleistocene elevation: Walcott, 97  
 Klamath Mountains, structure: Hershey, 03a  
 Lassen Peak, Plumas Co.: Diller, 93a; Harkness, 74; Miller (E I), 01; Wright (G F), 93j  
 eruptions: Boerker, 15; Boyce, 14; Diller, 91, 14b, c, 15c, 16a; Holway, 14a, 15, 15a; Palmer (A H), 16a; Sapper, 18a; Storms, 14; Turner, 15a; Wright (W H), 14; 1883: Dutton, 85b  
 geologic history: Diller, 16b  
 volcanic history: Diller, 16  
 Lassen Peak lava, viscous nature: Diller, 17c  
 Lassen Peak quadrangle: Diller, 95  
 Lava flows, recent: Wright (G F), 05c  
 Measurements of earthquake monuments: Baird, 11



## California—Continued.

*Physical geology—Continued.*

- Metamorphic rocks: Hanks, 01  
 Metamorphism in oil-bearing shale: Arnold, 07g  
 Mounds formed by crystallization: Hess, 10c  
 Mount Shasta: Diller, 95a, 15a  
 Mud volcanoes, Colorado Desert: Veatch, 57  
 Oil-bearing rocks, accumulation: Branner, 13a  
 Prairie mounds, origin: Le Conte, 77a  
 Pseudostratification, Santa Barbara Co.: Louderback, 12  
 Quartz, recent formation: Hunt, 80e  
 Rancho La Brea deposits: Matthew (W D), 13e; accumulation: Stoner, 13  
 Sand polishing, San Bernardino: Blake (W P) 55d  
 Sand-calcite concretions from Salton: Nichols (H W), 06  
 San Diego, mound formations: Barnes, 79  
 Sandstone dikes: Newson, 03a  
 San Francisco, elevation of land: Blake (J), 63  
 San Francisco Peninsula: Lawson, 95  
 San Luis quadrangle: Fairbanks, 04  
 Santa Cruz Range, structure: Newsom, 08  
 Sea caves, La Jolla: Winsted, 13  
 Secondary pseudostratification in Santa Barbara Co.: Louderback, 10b  
 Sedimentation, San Francisco Bay: Sumner, 14  
 Seismic topography of Coast ranges: Montessus de Ballore, 09  
 Sierra Nevada: Muir, 74a; Reyer, 86; Turner, 96  
   fault blocks: Davis (W M), 07  
   glacial denudation: Muir, 74c  
   mountain sculpture: Muir, 74  
   postglacial denudation: Muir, 74d  
   post-Tertiary elevation: Le Conte, 86  
   southern, structure: Buwalda, 15  
 Silica and lime deposition: Darton, 12b  
 Solfataras, Santa Barbara: Ford (H C), 90a  
 Transportation of detritus by Yuba River: Gilbert, 08b  
 Travertine, origin, Salton Sink: Jones (J C), 13b  
 Travertine falls and reefs, origin: Branner, 01a  
 Tufa deposits, Salton Sink: Jones (J C), 14  
 Volcanic eruptions, recent: Wright (G F), 93j  
 Volcanic springs, Colorado Desert: Le Conte (J L), 55  
 Volcano, so-called, in Santa Monica Mountains: Arnold, 08i  
 Water-worn vein specimens: Holman, 96
- Physiographic geology.*  
 Ancient river beds, Forest Hill Divide: Browne (R E), 90  
 Blake Sea, travertine record: MacDougal, 15a  
 Blue Lakes, history: Holway, 07  
 Cahuilla Basin: Blake (W P), 14; Powell, 91c  
 Calaveras Co., ancient channel system: Storms, 94  
 Coast, Bodega Bay to San Diego: Blake (W P), 56b; southern Cal.: Lawson, 93e  
 Coast islands: Le Conte, 87  
 Coast ranges: Willis, 00a; age: Fairbanks, 96e; Ransome, 97; north of San Francisco, section: Osmont, 05  
 Coast region: Davidson (G), 73

## California—Continued.

*Physiographic geology—Continued.*

- Colorado delta, desert basins of: MacDougal, 07  
 Colorado Desert: Barrows, 00; Blake (W P), 14, 15; Fairbanks, 10; Orcutt, 90; ancient lake: Blake (W P), 54  
 Coso Range: Reid (J A), 08  
 Death Valley: Campbell (M R), 02b, 03e; Chapman, 06; Hubbard (G D), 15a; Whitney, 68d  
 Debris fans: Hilgard, 02  
 Desert dry lakes: Bailey (G E), 04  
 Drainage changes: Branner, 06d; Holway, 07a  
 Drainage features: Lawson, 01a  
 Drift deposits: Blake (J), 52  
 Dry lakes, southern Cal.: Jenney, 89a  
 El Paso Range and southern Sierra Nevada: Baker (C L), 12  
 Evolution group of peaks: Le Conte (J N), 05  
 General: Bowman (A), 73a; Dana (J D), 49c; Fairbanks, 01; Frignet, 66; Gilbert, 75; Hilgard, 84e, 93, 93a; Lawson, 08; Whitney, 72c, 80; Wood (H O), 16a  
 Geomorphic features of middle Kern: Lawson, 06a  
 Geomorphogeny, northern coast: Lawson, 94; Tehachapi Valley system: Lawson, 06b  
 Glacial cirques, Sierra Nevada: Matthes, 15b; Mt. Whitney region: Durst, 08  
 Glacial stages, two, Klamath Mountains: Hershey, 03  
 Glaciation: Marcou, 83  
   Coast ranges: Holway, 11, 14c  
   Johnson's Pass, Sierras: Blake (J), 76b  
   Mt. Shasta: Packard (A S), 77a  
   San Bernardino Range: Fairbanks, 10a  
   Sierra Nevada: Blake (W P), 67d; Johnson (W D), 96; Knopf, 18; Le Conte, 73, 75, 98; Muir, 74b; Whitney, 67f, 80a  
 Glaciers, Sierra Nevada: Muir, 72a, 74b; Russell, 84a, 85b; variations: Gilbert, 04b; Yosemite Valley: Kneeland, 72  
 Gold belt: McGee, 99  
 Gravel channels, ancient: Storms, 05  
 Great Basin: Brewer (W H), 89  
 Great Basin ranges: Spurr, 01a  
 Great Valley: Ransome, 96a  
 Hetch-Hetchy Valley: Hoffman (C F), 68  
 High Sierra: Le Conte (J N), 07  
 Imperial Valley: Beal, 15a  
 Interglacial periods, Sierra Nevada Mountains: Manson, 13  
 Intermont plains: Keyes, 08a  
 Inyo Range and eastern slope of southern Sierra Nevada: Knopf, 18  
 Iron Canyon: Studley, 08  
 Islands, southern Cal.: Smith (W S T), 00  
 Klamath Mountains: Anderson (F M), 01, 02a; Diller, 02a  
 Klamath region: Hershey, 02e; Sierran valleys: Hershey, 03b; terraces: Hershey, 03d  
 Lake Cahuilla: Blake (W P), 15  
 Lake Tahoe region: Louderback, 11  
 Lassen Peak district: Diller, 91; Miller (E I), 01  
 Migration of divides: Smith (W S T), 97a  
 Mineral King district: Knopf, 05



## California—Continued.

*Physiographic geology*—Continued.

- Mohave Desert: Campbell (M R), 02b; MacDougall, 16  
 Mohawk Valley: Turner, 91a  
 Mono region: Le Conte, 79, 79a; McGee, 85  
 Mono Valley, Quaternary history: Russell, 89  
 Moraines, post-Pleistocene, Sierra Nevada: Matthes, 17; Yosemite: Matthes, 14d  
 Mount Lyell, glacier: Lee, 05a  
 Mount Shasta: Diller, 95a, 15a  
 Mount Whitney: Hallock, 03  
 Neocene rivers, Sierra Nevada: Lindgren, 93, 03a  
 Northern Cal.: Diller, 94  
 Orleans Basin, river terraces: Hershey, 04a  
 Oscillations of coast, Pliocene and Pleistocene: Fairbanks, 97  
 Owens Valley: Trowbridge, 11  
 Penepplain, Tertiary, Klamath region: Hershey, 02g  
 Physiographic provinces: Holway, 09  
 Pliocene rivers: Bowman, 73  
 Point Reyes Peninsula: Anderson (F M), 99  
 Pyramid Peak quadrangle: Lindgren, 96a  
 River beds, old: Le Conte, 80  
 River channels, ancient: Kimble, 07a  
 Russian River: Holway, 13  
 Salinas Valley: Nutter, 01  
 Salton sea: Koch, 07; MacDougall, 14, 15, 16, 17; Redway, 07a  
 Salton Sink: Blake (W P), 15  
 San Bernardino and San Gabriel ranges: Mendenhall, 08  
 Sand dunes, Monterey: Campbell (M R), 15a  
 San Francisco Bay: Holway, 14  
 San Francisco district: Lawson, 14  
 San Jacinto region: Arnold, 18  
 San Luis quadrangle: Fairbanks, 04  
 San Luis Obispo Co.: Arnold, 09c  
 Santa Barbara channel islands: Yates, 90  
 Santa Catalina Island: Ritter, 01; Smith (W S T), 97  
 Santa Clara Valley, drainage changes: Branner, 07  
 Santa Cruz Co., shore topography: Wilson (M E), 07  
 Santa Cruz Mountains, Neocene: Ashley, 96  
 Sierra Costa Mountains, ancient glaciers: Hershey, 00b  
 Sierra Nevada Mountains: Alling, 14; Gilbert, 17; Johnson (W D), 05; Machatschek, 15; Muir, 74a, 75, 75a; Reyer, 86  
   crest lines: Gilbert, 04c  
   fault blocks: Davis (W M), 07  
   fault scarp: Fairbanks, 98a  
   mountain sculpture: Muir, 74  
   post-Tertiary elevation: Turner, 03  
   south of Mt. Whitney: Goodyear, 73a  
   Tertiary-Quaternary orogenic history: Matthes, 16  
 Sierran: Hershey, 02  
 Siskiyou Range: Anderson (F M), 03  
 Southeastern Cal.: Mendenhall, 09a  
 Southern Cal.: Daneš, 09; Hershey, 02f; Rath, 85k  
 Submarine coastal valleys: Smith (W S T), 02

## California—Continued.

*Physiographic geology*—Continued.

- Submerged coastal valleys: Davidson (G), 97  
 Table Mountains: Hanks, 01  
 Terraces, northwestern Cal.: Hershey, 03c; Sierra Nevada: Gilbert, 05d  
 Topography: Drake, 97a  
 Trinity River basin: Diller, 11a  
 Upper Kern Basin, geomorphogeny: Lawson, 04  
 Volcanoes: Hague, 83  
 Whitney Creek, glaciation and present form: Dickerson, 08  
 Yolo Co., Cache Creek: Durst, 16  
 Yosemite Valley: Andrews (E C), 10; Clark (G), 73, 10; French, 14; Matthes, 10b, 11, 12, 14a; Whitney, 68b; Williams (J H), 14  
   cliff sculpture: Matthes, 10a  
   débris tracks on domes: Matthes, 09a  
   glacial character of: Matthes, 09  
   El Capitan moraine and ancient Lake Yosemite: Matthes, 10  
   Half Dome: Matthes, 10  
   hanging valleys: Branner, 03a; Johnson; (D W), 11  
   origin: Blake (W P), 67d, 00; Gannett, 01, Johnson (D W), 10; Muir, 74a; Turner, 98d, 00a  
   striped rock floor: Matthes, 10b  
   topographic map of: Matthes, 07

*Underground water.*

- Antelope Valley: Johnson (H R), 11  
 Breathing gas well, San Luis Obispo Co.: Fairbanks, 96b  
 Cienegas, southern Cal.: Hilgard, 92  
 Foothill belt of southern Cal.: Mendenhall, 08a  
 Ground water problems: Mendenhall, 09  
 Hot springs, Colusa Co.: Fairbanks, 94d  
 Indio region, ground waters: Mendenhall, 09b  
 Livermore Valley: Branner, 12a, b; Lawson, 12g  
 Los Angeles Co.: Chase, 73  
 Morgan Hill area: Clark (W O), 17  
 Niles area, ground water: Clark (W O), 15  
 Oil-field waters, San Joaquin Valley: Rogers (G S), 17a  
 Owens Valley: Lee (C H), 12; Lee (W T), 06  
 Pluton geysers: Shepherd, 51  
 Sacramento Valley: Bryan, 15  
 San Bernardino Valley: Mendenhall, 05d  
 San Joaquin Valley: Mendenhall, 08b, 16  
 Southeastern Cal.: Loew, 76; Mendenhall, 09a  
 Southern Cal.: Mendenhall, 05a, b, c  
 Springs: Waring (G A), 15  
 Sunol Valley: Branner, 12b  
 Underground reservoirs: Lee (C H), 13  
 Callibrachion: Moodie, 09  
 Callixylon: Elkins, 14  
 Calvin, Samuel, biography: Bain, 11a; Kay, 11b; Shimek, 12  
 Calyptraeidae: Keyes, 90e  
 Camarasaurus: Mook, 14, 14a; Osborn, 98f  
 Camarocrinus: Sardeson, 08b; Schuchert, 03d, 04a  
 Camarophorella, a Mississippian meristelloid brachiopod: Hyde, 08a  
 Camasland, Wash.: Smith (G O), 00a  
 Cambria coal field, Wyo.: Simmons, 12



**Cambrian.** *See also* Paleontology, Cambrian.

- Alabama, Birmingham district: Burchard, 10c; Butts, 10a; Gibson, 93  
 Coosa Valley: Hayes, 94e  
 Gadsden quadrangle: Hayes, 96  
 northeastern: Hayes, 92  
 Alaska, international boundary: Cairnes, 14  
 Seward Peninsula: Kindle, 11d  
 southeastern: Wright (F E), 08f  
 Alaska-Yukon boundary: Cairnes, 14b  
 Alberta: Malcolm, 13  
 Athabasca River: McConnell, 91b  
 Robson Peak district: Walcott, 10  
 Crowsnest field: Rose, 17a  
 northern: McConnell, 93  
 Rocky Mountain region: Burling, 16; McConnell, 87  
 Appalachians: Keith, 94a; southern: Elliott (J B), 83; Walcott, 92b  
 Arctic regions: McMillan, 10; Ellesmere Land: Hottedahl, 13, 17  
 Arizona: Blake (W P), 01a; Newberry, 61; Ransome, 16  
 Bisbee quadrangle: Ransome, 04, 04b  
 Clifton quadrangle: Lindgren, 05  
 Clifton-Morenci district: Lindgren, 05a  
 Globe district: Ransome, 03, 04a  
 Grand Canyon district: Noble, 14; Schuchert, 18c; Walcott, 83c  
 Kanab Valley: Walcott, 80  
 Mohave Co., Grand Gulch region: Hill (J M), 14b  
 Ray quadrangle: Ransome, 15b  
 Santa Rita and Patagonia Mountains: Schrader, 15  
 Warren district: Bonillas, 16  
 western: Lee (W T), 03a  
 Arkansas, Caddo Gap and De Queen quadrangles: Miser, 17; northern: Ulrich, 04  
 Atlantic province: Walcott, 00a  
 Basal series, Acadia: Matthew (G F), 88a  
 Base: Winchell (N H), 95f; paleontologic: Winchell (N H), 95g  
 Belt formation, Helena, Mont.: Rothpletz, 15  
 Black Hills region: Hayden, 58, 61; Meck, 58b  
 Blue Ridge: Keith, 92a  
 British Columbia: Evans (H F), 09; Walcott, 08a  
 Cambro-Ordovician boundary: Walcott, 10  
 Cordilleran formations: Daly, 13a  
 East Kootenay: Schofield, 10, 10a, 12, 14  
 Elko to Kootenay Lake: Schofield, 13  
 Field area: Allan, 12, 14; Walcott, 11  
 Fraser River region: Malloch, 10  
 Golden-Kamloops: Daly (R A), 15  
 Ice River district: Allan, 12a  
 Kamloops area: Dawson (G M), 95  
 Kicking Horse Valley: Walcott, 12b  
 Mount Bosworth: Burling, 12a, 16c  
 Mount Stephen: McConnell, 89; Walcott, 88a; Winwood, 85; Woodward (H), 02  
 Robson Peak district: Walcott, 10  
 Rocky Mountains: Allan, 13  
 Ross Lake section: Walcott, 17  
 Selkirk and Purcell Mountains: Daly, 14a  
 Selkirk Mountains: Burwash, 11; Dawson (G M), 91b

**Cambrian—Continued.**

- British Columbia: Sherbrooke formation: Burling, 12a  
 Shuswap lakes region: Daly, 12  
 Similkameen district: Evans (H F), 08a  
 Vancouver Island: Hall (C W), 06  
 West Kootenay and Boundary districts: LeRoy, 13  
 West Kootenay district: McConnell, 98; Ymir area; Drysdale, 17  
 Yellow Head Pass region: McEvoy, 00  
 California: Ball (S H), 07; Darton, 07; Smith (J P), 10, 16; Walcott, 08a  
 eastern: Spurr, 03  
 Inyo and White Mountains: Knopf, 14a  
 Inyo Co.: Walcott, 95b, c  
 Inyo Range: Kirk, 18  
 southeastern: Hershey, 12b  
 Canada: Ami, 01h; Hunt, 67d; Logan, 67; Marcou, 62b; Selwyn, 84  
 eastern: Dawson (J W), 88h; Matthew (G F), 01f, 04c  
 maritime provinces: Matthew (G F), 08a  
 Rocky Mountain region: Dawson (G M), 01  
 Cape Breton Island: Matthew (G F), 14  
 Catocin belt: Keith, 94a  
 Classification: Grabau, 09; Irving, 88; Marcou, 89e; Matthew (G F), 89; Walcott, 86a  
 Colorado, Alma district, Patton, 12  
 Anthracite-Crested Butte quadrangles: Eldridge, 94  
 Arkansas Valley: Darton, 06f  
 Aspen district: Spurr, 98  
 Castle Rock region: Lee (W T), 02b; Richardson (G B), 15  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Denver Basin: Emmons (S F), 96  
 Engineer Mountain quadrangle: Cross, 10  
 Gold Brick district: Crawford, 16  
 Leadville district: Emmons (S F), 82, 86  
 Monarch and Tomichi districts: Crawford, 13  
 Needle Mountains quadrangle: Cross, 05b  
 northwestern: Gale, 10  
 Pikes Peak sheet: Cross, 94  
 Red Cliff region: Means, 15  
 Rico quadrangle: Cross, 05a  
 Silverton quadrangle: Cross, 05  
 Tenmile quadrangle: Emmons (S F), 98  
 Connecticut: Gregory (H E), 07a  
 Cordillera: Burling, 14; forty-ninth parallel. Daly, 13  
 Cordilleran formations: Walcott, 08a, 17  
 Cordilleran region: Hall, 77; Walcott, 15  
 Correlation: Walcott, 83e, 91, 93c, 08a  
 Eruptive epochs, Lower Cambrian: Winchell (N H), 95h  
 Etchiminian: Matthew (G F), 00c; Walcott, 00c  
 Faunas, succession: Walcott, 91c  
 General: Barrande, 59, 60a, 61, 61a; Bigsby, 63; Credner, 68; Emmons (E), 54; Frech, 99; Hall, 61, 62l; Hicks (H), 87; Hitchcock (C H), 88; Hunt, 72a, 78, 84b; Marcou, 60, 60a, 90, 97; Matthew (G F), 88b, 91a; Rogers (W B), 61b, f; Ulrich, 11a; Walcott, 84f, 86, 91a, 93c, 10, 15, 16; Winchell (N H), 88g, 97d



## Cambrian—Continued.

- Georgia: McCallie, 08a, 10; Veatch (J O), 09; Watson, 06  
 Appalachian Valley: Shearer, 18a  
 Coosa Valley: Hayes, 94e  
 Ellijay quadrangle: La Forge 13  
 northern: Maynard, 12  
 northwestern: Spencer (J W), 93  
 Polk Co.: Spencer (J W), 91a  
 Ringgold sheet: Hayes, 94  
 Rome quadrangle: Hayes, 02  
 Great Plains: Darton, 05  
 Greenland: Bøggild, 17  
 Group terms: Walcott, 10  
 Idaho: Walcott, 08a  
 Coeur d'Alene region: Hershey, 12b  
 Lemhi County: Umpleby, 13  
 Mackay region: Umpleby, 17  
 phosphate reserve: Richards (R W), 11b  
 southeastern: Schultz, 18  
 Illinois: Weller, 06  
 Iowa: Beyer, 07b; Calvin, 06a; Keyes, 93a Norton, 12  
 Allamakee Co.: Calvin, 95a  
 Clayton Co.: Leonard, 06  
 Lake Superior region: Brooks, 76a; Foster, 51g; Irving, 88; Van Hise, 93b; Winchell (N H), 95j, n, 97d  
 Limits: Hunt, 80b  
 Magnesian series: Hall (C W), 95, 05a; Sardeson, 96b  
 Maine: Emmons (W H), 10a  
 Portland region: Hitchcock (C H), 74g  
 Rockland quadrangle: Bastin, 08a  
 Manitoba, eastern: Dowling, 95  
 Maryland: Clark (W B), 97b, 06c; Walcott, 92c  
 Cockeysville marble: Mathews, 05a  
 Harpers Ferry quadrangle: Keith, 94  
 Piedmont formations: Mathews, 05  
 Piedmont plateau: Mathews, 04  
 Tolchester quadrangle: Miller (B L), 17  
 Massachusetts: Emerson (B K), 17; Loughlin, 14b  
 Berkshire Co.: Dana, 72g, 77b; Emerson, 99  
 Boston Basin: Crosby, 84b; Grabau, 00a; Hunt, 71g; LaForge, 09; Blue Hills area: Crosby, 90  
 Braintree: Jackson, 56i; Lea, 57b; Rogers (W B), 56c  
 Bristol Co.: Shaler, 88a  
 eastern: Crosby, 80; Dodge (W W), 75; Foerste, 89  
 Essex Co.: Sears, 91a, 05  
 Green Mountains: Pumpelly, 94  
 Hampshire area: Emerson, 95b, 98  
 Hawley sheet: Emerson, 92  
 Hingham: Crosby, 92a  
 Holyoke quadrangle: Emerson, 98a  
 Mount Washington: Hobbs, 93  
 Narragansett Basin: Shaler, 99  
 Neponset Valley: Crosby, 05c  
 North Attleboro: Gorham, 05  
 Rensselaer grit plateau: Dale, 93  
 southern: Emerson, 95c  
 Mexico, Sonora: Dumble, 00a

## Cambrian—Continued.

- Michigan: Lane, 07, 09  
 Limestone Mountain, Houghton Co.: Case, 15a  
 Menominee quadrangle: Van Hise, 00  
 Minnesota: Grout, 14; Hall, 69a; Kloos, 71; Winchell (N H), 73a, 86b, 89b, 01  
 Blue Earth Co.: Upham, 84  
 Brown and Redwood cos.: Upham, 84  
 Carlton Co.: Winchell (N H), 99a  
 Carver and Scott cos.: Upham, 88  
 Cottonwood and Jackson cos.: Upham, 84  
 Dakota Co.: Winchell (N H), 88a  
 Dodge Co.: Harrington (M W), 84  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Goodhue Co.: Winchell (N H), 88a  
 Houston Co.: Winchell (N H), 77a, 84a  
 Le Sueur Co.: Upham, 84  
 Minneapolis-St. Paul district: Sardeson, 16  
 Olmsted Co.: Harrington (M W), 76, 84  
 Pine Co.: Upham, 88  
 Pipestone and Rock cos.: Winchell (N H), 84a  
 Redstone region: Sardeson, 08a  
 Rice Co.: Winchell (N H), 84a  
 St. Croix Dalles: Berkey, 97  
 St. Louis Co.: Winchell (N H), 99a  
 Sibley and Nicollet cos.: Upham, 88  
 southeastern: Hall (C W), 92  
 southern: Hall (C W), 11a  
 Wabasha Co.: Winchell (N H), 88a  
 Watonwan and Martin cos.: Upham, 84  
 Winona Co.: Winchell (N H), 84a  
 Mississippi Valley, upper: Owen (D D), 52  
 Missouri: Bain, 05e; Branson, 18a; Broadhead, 93; Buckley, 04; Gallaher, 00; King (H), 51; Shepard, 07; Swallow, 55a, 58; Winslow, 93a, 95  
 barite districts: Tarr (W A), 18  
 Cape Girardeau Co.: Shumard (B F), 63d, 73  
 Crawford Co.: Shumard (B F), 73  
 Greene Co.: Shepard, 15  
 Iron Mountain sheet: Winslow, 94a  
 Jefferson Co.: Shumard (B F), 73  
 Laclede Co.: Shumard (B F), 73  
 Madison Co.: Broadhead, 74  
 magnesium limestones: Keys, 02b  
 Miller Co.: Ball, 03  
 Miller Co.: Meek, 73c  
 Mine la Motte area: Keyes, 95h  
 Moniteau Co.: Van Horn, 05  
 Morgan Co.: Marbut, 08; Meek, 73c  
 Newburg district: Lee (W), 11  
 Ozark Co.: Shumard (B F), 73  
 Ozark region: Buehler, 17; Crane (G W), 12; Keyes, 95g, k; Nason, 93  
 Ozark series: Broadhead, 91  
 Ozark uplift: Broadhead, 89, 93  
 Perry Co.: Shumard (B F), 73  
 Phelps Co.: Shumard (B F), 73  
 Pulaski Co.: Shumard (B F), 73  
 Rolla quadrangle: Lee (W), 14  
 saccharoidal sandstone: Broadhead, 04c  
 St. Francois Co.: Nason, 01a  
 St. Francois Mountains: Keyes, 01d  
 Ste. Genevieve Co.: Shumard (B F), 59b, 73  
 southeastern: Buckley, 09; Winslow, 96  
 southern: Hughes, 11  
 Wright Co.: Shumard (B F), 73



## Cambrian—Continued.

Montana: Meek, 73; Walcott, 06, 08a  
 Castle Mountain district: Weed, 96a  
 Dillon quadrangle: Winchell (A N), 14  
 Elkhorn district, Jefferson Co.: Weed, 01  
 Elkhorn Mountains: Stone (R W), 11  
 Fort Benton quadrangle: Weed, 99  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg fields: Pardee, 17  
 Gordon Mountain section: Walcott, 17  
 Helena region: Knopf, 13; Rothpletz, 15; Walcott, 14  
 Judith Mountains: Weed, 98  
 Little Belt Mountains: Weed, 99a, 00  
 Little Rocky Mountains: Weed, 96b  
 Livingston quadrangle: Iddings, 94  
 northeastern: Collier, 18a  
 Park Co.: Emmons (W H), 08  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Three Forks region: Haynes, 16a; Peale, 93, 96  
 Mount Whyte formation: Walcott, 17a  
 Nevada: Ball (S H), 07; Spurr, 03; Walcott, 08e; Whitney, 72  
 eastern: Hershey, 12b  
 Esmeralda Co.: Turner, 02  
 Eureka district: Hague (A), 83, 92  
 Goldfield district: Ransome, 09  
 northeastern: Emmons (W H), 10  
 Silver Peak quadrangle: Spurr, 06b; Turner, 09  
 New Brunswick: Bailey, 01a; Credner, 65; Dawson (J W), 68c; Ells, 06a, 08a; Matthew (G F), 82, 88b, c, 08, 14  
 basal series: Matthew (G F), 88, 90  
 Kennebecasis Valley: Matthew (G F), 98  
 northern: Ells, 81  
 St. John area: Ells, 08f; Hayes (A O), 14  
 southern: Bailey, 65, 72, 79, 80; Matthew, 65c  
 volcanic rocks: Bailey, 05a  
 Newfoundland: Matthew (G F), 88b; Milne, 77; Murray, 66, 70a, 81; Weston, 96a; Whiteaves, 78b  
 Avalon Peninsula: Howley, 82  
 Conception and Trinity bays: Dale (N C), 15; Van Ingen, 14a  
 eastern: Howley, 89a  
 Trinity Bay region: Murray, 73  
 White Bay: Howley, 03a  
 New Hampshire: Hitchcock (C H), 77  
 New Jersey: Cook (G H), 68; Foerste, 93b; Kümmel, 09; Lewis, 15; Weller, 03  
 Franklin Furnace quadrangle: Kümmel, 08a  
 Green Pond region: Darton, 94f; Kümmel, 02a; Walcott, 94e  
 Kittatinny Valley: Kümmel, 01b; Weller, 01  
 Raritan quadrangle: Bayley, 14  
 Sussex Co.: Nason, 94c; Wolff, 98  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Gordon (C H), 06; Lindgren, 10  
 central: Lee (W T), 08a  
 Deming quadrangle: Darton, 17  
 Luna Co.: Darton, 16  
 Silver City quadrangle: Paige, 16  
 southern: Darton, 17a

## Cambrian—Continued.

New York: Clarke (J M), 99i, 03g; Cushing, 11; Hartnagel, 12; Walcott, 10  
 Adirondack Mountains: Kemp, 96f; Miller (W J), 17a; north of: Cushing, 99; northern: Cushing, 05a; southern: Kemp, 99a; Miller (W J), 13  
 Broadalbin quadrangle: Miller (W J), 11b  
 Clinton Co.: Cushing, 94, 97, 01  
 Columbia Co.: Ford (S W), 84  
 Dutchess Co.: Dwight, 87, 89; Merrill (F J H), 05a  
 eastern: Dale, 99; Ruedemann, 03  
 Edwards district: Newland, 17a  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Essex Co.: Kemp, 97; Essex and Willsboro townships: White (T G), 94  
 Highlands: Berkey, 07  
 Hudson Valley: Dale, 04a  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Little Falls dolomite: Ulrich, 10, 10a  
 Mohawk Valley: Darton, 94c, 97  
 northern: Emmons (E), 42  
 Ogdensburg region: Cushing, 16  
 Orange Co.: Ries, 97b  
 Paleozoic section: Cushing, 08  
 Paradox Lake quadrangle: Ogilvie, 05  
 Port Henry: Hunt, 83d  
 Potsdam sandstone, Lake Champlain region: Van Ingen, 02  
 Poughkeepsie region: Dwight, 86, 86a; Gordon (C E), 10, 11  
 southeastern: Berkey, 11  
 Rensselaer Co.: Ford (S W), 75, 85  
 Rensselaer grit plateau: Dale, 93  
 St. Lawrence River region: Smyth (C H), 01  
 Saratoga Springs region: Cushing, 14  
 Skunnemunk Mountain: Darton, 94f  
 southeastern: Mather, 43; Merrill (F J H), 98  
 Third district: Vanuxem, 42  
 Thousand Islands region: Cushing, 10a  
 Troy: Ford (S W), 71a, 73a; Martin (D S), 73  
 Utica: Walcott, 88b  
 Washington Co.: Walcott, 87c  
 Westchester Co.: Dana, 80d  
 New York and adjoining States: Gordon (C E), 09  
 Nomenclature: Dwight, 90b  
 North America: Willis, 12  
 North Carolina: Emmons (E), 56; Nitze, 97b  
 Asheville quadrangle: Keith, 04  
 Cranberry quadrangle: Keith, 03  
 Ellijay quadrangle: LaForge, 13  
 Mount Mitchell quadrangle: Keith, 05a  
 Nantahala quadrangle: Keith, 07  
 Pisgah quadrangle: Keith, 07a  
 Roan Mountain quadrangle: Keith, 07b  
 Northwest Territory: Keele, 10  
 Nova Scotia: Matthew (G F), 88b; Malcolm, 12  
 Antigonish Co.: Honeyman, 86b  
 Arisaig-Antigonish district: Williams (M Y), 11, 12  
 Boisdale Hills, Cape Breton Island: Boright, 04  
 Cape Breton Island: Matthew (G F), 00, 02a, 03



## Cambrian—Continued.

- Nova Scotia: Dictyonemaslates: Ami, 02b, 03a; Poole, 03d  
 eastern: Faribault, 87  
 Halifax and Colchester cos.: Honeyman, 83b  
 Halifax Co.: Hare, 81  
 Kings and Hants cos.: Fletcher, 02  
 Lunenburg Co.: Faribault, 10a  
 Point Pleasant: Cameron, 81  
 southwestern: Bailey, 95, 98  
 Ohio, Findlay borings: Condit, 13  
 Oklahoma: Gould, 05; Wallis, 15  
 Arbuckle Mountains: Reeds, 10; Taff, 04  
 Atoka quadrangle: Taff, 02  
 southern: Hutchison, 11  
 Tishomingo quadrangle: Taff, 03  
 Wichita Mountains: Bain, 00; Gould, 02, 04a; Taff 04  
 Olenellus zone, age: Brögger, 86; Dawson (J W), 89f  
 Ontario, eastern: Ells, 95a, 03d  
 James Bay region: Dowling, 04  
 Lake Superior: Selwyn, 83d  
 Ottawa region: Ami, 96a; ripple marks: Kindle, 14d  
 Rideau lakes: Drummond, 95  
 Ozark region: Adams (G I), 01  
 Paleogeographic map: Willis, 09  
 Pennsylvania: Foerste, 93b; Lesley, 92; Rogers (H D), 58; Walcott, 92c, 94d  
 Blair and Huntingdon cos. section: Butts, 18  
 Blair Co.: Platt (F), 81a  
 Berks Co.: D'Invilliers, 83  
 Bucks Co.: Hall (C E), 81  
 central: Ziegler, 12  
 Chester Co., Doe Run-Avondale region: Bliss (E F), 16  
 Chester Valley, Potsdam outcrop: Lewis, 80p  
 Coatesville quadrangle: Bliss (E F), 14  
 Cumberland-Lebanon Valley: Stose, 17  
 Lancaster Co.: Roddy, 09  
 Lehigh and Northampton cos.: Peck, 04, 08  
 Lehigh Co.: Lesley, 83a; Miller (B L), 14; Prime, 75, 78, 78a  
 Lehigh region: Miller (B L), 11b; Peck, 11; Wherry, 09b  
 Lycoming Co.: Sherwood, 80  
 Montgomery Co.: Hall (C E), 81; Rand, 80d  
 Northampton Co.: Lesley, 83a  
 Philadelphia district: Bascom, 04, 09a  
 Piedmont district: Bascom, 05  
 Piedmont formations: Mathews, 05  
 southeastern: Rand, 00; Walcott, 96a  
 Southern: Stose, 08  
 South Mountain: Bascom, 96; Eaton (H N), 12; Stose, 06  
 Trenton quadrangle: Bascom, 09b  
 York Co.: Frazer, 86a  
 York Valley: Jandorf, 12  
 Potsdam fossiliferous pebbles in Carboniferous conglomerate: Rogers (W B), 61  
 Potsdam sandstone: Hall, 63j; Rogers (W B), 61b; Winchell (N H), 82a, 93e  
 Primordial quartzite: Winchell (N H), 88f  
 Quebec: Billings, 62c; Ells, 95a, 97d, 98a; Logan, 60a; Marcou, 61a, c, 89; Selwyn, 79b; Walcott, 90f

## Cambrian—Continued.

- Quebec: Brome and Missisquoi cos.: Harvie, 15  
 Buckingham, Potsdam: Ami, 82  
 Coleraine area: Knox, 18  
 eastern townships: Ells, 88  
 Gaspé district: Mailhiot, 11  
 Gaspé Peninsula: Clarke (J M), 13d; Ells, 83a; Low, 85  
 Labrador Peninsula: Low, 96a, 97a, 98  
 Mistassini region: Low, 85a  
 Montreal area: Ami, 96; Ells, 96  
 Montreal-Quebec region: Logan, 54  
 Mount Yamaska: Young (G A), 06  
 New Quebec territory: Denis, 13  
 Orford area: Harvie, 12  
 Quebec: Marcou, 91  
 St. Lawrence, region south of: Richardson, 70  
 southern: Dresser 10b, 12, 13; Harvie, 14  
 Temiscouata and Rimouski cos.: Bailey, 93  
 Ungava region: Low, 99a  
 Rhode Island: Emerson, 07  
 Narrangansett Basin: Shaler, 99  
 Rocky Mountain region: Hayden, 62a; Tomlinson, 17  
 St. Croix region: Owen (D D), 51a  
 St. John group: Matthew (G F), 85a, 93f, 98a; Dictyonema horizon: Matthew (G F), 91b  
 Saratogian: Walcott, 03  
 Sedimentation conditions in Cambrian: Burling, 15  
 South Carolina, Pisgah quadrangle: Keith 07a  
 South Dakota: Todd, 95, 98  
 Black Hills: Carpenter (F R), 88; Crosby, 88a; Darton, 01a, 04c, 09, 09a, 18; Newton, 80; Whitfield, 77; Winchell (N H), 75; northern: Irving, 99; Jaggard, 04c; southern: O'Harra, 99  
 Minnehaha Co.: Upham, 85  
 Stockbridge limestone: Wolff, 91a  
 Taconic area: Walcott, 88; Point Levis: Marcou, 64a  
 Taconic question: Barrande, 61; Hall, 62l; Hunt, 83a; Miller (S A), 88  
 Taconic specimens: Hall, 89a  
 Taconic system: Emmons (E), 44; Hunt, 51, 61d; Marcou, 85, 88b, 89c, 90c; Rogers (W B), 61f; Winchell (A), 88c  
 Tennessee: Safford, 56, 69  
 Briceville quadrangle: Keith, 96b  
 Bristol quadrangle: Campbell (M R), 99a  
 Chattanooga quadrangle: Hayes, 94b  
 Chilhowee Mountain: Keith, 92  
 Cleveland quadrangle: Hayes, 95a  
 Coosa Valley: McCally, 97  
 Cranberry quadrangle: Keith, 03  
 Ducktown deposits: Emmons (W H), 11  
 Ellijay quadrangle: LaForge, 13  
 Estillville quadrangle: Campbell (M R), 94  
 Greenville quadrangle: Keith, 03  
 Johnson Co.: Jenkins, 16  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Loudon quadrangle: Keith, 96  
 Maynardville quadrangle: Keith, 01  
 Morristown quadrangle: Keith, 96a  
 Roan Mountain quadrangle: Keith, 07b



## Cambrian—Continued.

- Texas: Buckley, 66; Dumble, 90; Shumard (B F), 61; Udden, 16a  
 Black and Grand prairies: Hill (R T), 01  
 central: Comstock, 90, 91; Walcott, 84c  
 El Paso quadrangle: Richardson (G B), 09  
 Llano-Burnet region: Paige, 11, 12  
 trans-Pecos: Richardson (G B), 04, 08  
 trans-Pecos front range: Baker (C L), 17  
 Van Horn quadrangle: Richardson (G B), 14  
 Tribes Hill formation, age: Raymond (P E), 10d  
 Upper Mississippi Valley: Walcott, 10  
 Utah: Meek, 73; Walcott, 08a, e  
 Cottonwood, American Fork region: Butler (B S), 15  
 Promontory district: Butler (B S), 16  
 Randolph quadrangle: Richardson (G B), 13  
 San Francisco district: Butler (B S), 13  
 Tintic district: Smith (G O), 00; Tower, 99  
 Uinta Mountains: Berkey, 05a  
 Uinta Range: Weeks, 07  
 Wasatch Mountains: Blackwelder, 10a; Hintze, 13; Loughlin, 13  
 Vermont: Billings, 62c, d; Dale (T N), 16; Dana, 77a; Edson, 06, 06a; Foerste, 93b; Hall, 62p; Hitchcock (C H), 84a; Hitchcock (E), 61; Hunt, 68a; Marcou, 61c, 62b, 81, 88a; Perkins, 08d; Perry, 68a, 69; Whitfield, 84  
 Albany terranes: Richardson (C H), 12a  
 Bennington: Gordon (C E), 14  
 Calais, East Montpelier, and Berlin: Richardson (C H), 16  
 Chittendon Co.: Perkins, 08b  
 Craftsbury: Richardson (C H), 12  
 Franklin Co.: Perkins, 08a  
 Green Mountain region: Perkins (G H), 12  
 Greensboro: Richardson (C H), 14  
 Hardwick: Richardson (C H), 14a  
 Irasburg terranes: Richardson (C H), 12b  
 Monticello area: Lambeth, 01  
 Newport, Troy, and Coventry: Richardson (C H), 08  
 northern: Hall (S R), 45  
 Potsdam sandstone: Perry, 68  
 Ripton region: Dale, 10a  
 Rutland-Danby ridge: Dale, 94a  
 Stockbridge limestone: Dale, 92  
 Swanton: Edson, 08  
 Taconic Mountains: Dale, 04c; Keith, 13  
 western: Dale, 99; Perkins (G H), 16  
 Woodbury: Richardson (C H), 14a  
 Virginia: Bassler, 07, 08a; Campbell (H D), 05; Fontaine, 75a; Walcott, 92b  
 Abington quadrangle: Stose, 14  
 Balcony Falls region: Campbell (H D), 85; Campbell (J L), 84  
 Blue Ridge: Campbell (J L), 79b  
 Bristol quadrangle: Campbell (M R), 99a  
 central: Campbell (J L), 79  
 Estillville quadrangle: Campbell (M R), 94  
 Harpers Ferry quadrangle: Keith, 94  
 James River basin: Taber, 13  
 James River Gap: Watson, 15a  
 James River valley: Campbell (J L), 82  
 Massanutten Mountain: Spencer (A C), 97

## Cambrian—Continued.

- Virginia: Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Piedmont region: Watson, 13d  
 northeastern: Watson, 11e  
 Shenandoah limestone: Bassler, 05b  
 Shenandoah Valley: Hewett, 18  
 southwestern: Stevenson, 87  
 Tazewell quadrangle: Campbell (M R), 97  
 western: Bassler, 09  
 Western States, fortieth parallel: King (C), 76a  
 West Virginia: Grimsley, 06  
 Harpers Ferry quadrangle: Keith, 94  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Wisconsin: Chamberlin, 83; Hall, 62j; Weidman, 15; Whitfield, 78  
 central: Irving, 77  
 Devil's Lake region: Eaton (J H), 72  
 Lake Superior region: Grant (U S), 01  
 Mississippi region: Strong, 82  
 north central: Weidman, 07a  
 northern: Sweet, 76a  
 St. Croix Dalles: Berkey, 97  
 St. Croix district: Strong, 80; Wooster, 82, 84  
 south central: Irving, 75  
 southeastern: Alden, 18; Lapham, 51a  
 southwestern: Grant (U S), 03; Strong, 77  
 Sparta shale: Shipton, 16a  
 Wyoming: Darton, 08  
 Absaroka quadrangle: Hague, 99b  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Big Horn basin: Fisher (C A), 06  
 Big Horn Mountains: Darton, 04, 06e  
 Black Hills region: Darton, 09  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Douglas oil field, Converse Co.: Jamison, 12  
 Fremont Co.: Jamison, 11a  
 northwest: Eldridge, 94a  
 Owl Creek Mountains: Darton, 06  
 Sundance quadrangle: Darton, 05a  
 western: Blackwelder, 18b; Comstock, 74; Schultz, 18  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yellowstone National Park: Hague, 99  
 Yukon, international boundary: Cairnes, 14  
 Camden chert, Tenn.: Safford, 99  
 Camden coal field, Ark.: Taff, 00a  
 Camp Clark folio, Neb. (no. 87): Darton, 03  
 Camp Custer region, Mich.: Leverett, 18  
 Camp Dodge region, Iowa: Lees, 18, 18a  
 Camp Gordon region, Ga., Matthes, 18a  
 Camp Grant quadrangle: U S G S, 18  
 Camp McClellan, Anniston quadrangle, Ala.: Matthes, 18  
 Camp Mills region, Long Island: Alden, 18a  
 Camp Pike region, Ark.: Stephenson, 18c  
 Camp Sherman area, Ohio: Campbell (M R), 18  
 Camp Taylor region, Ky.: Butts, 18a  
 Camp Upton region, N. Y.: Alden, 18b  
 Camptosaurus: Gilmore, 07, 09; restoration: Marsh, 94



Canada (general). *See also names of Provinces.*

- Acadian basin: Bailey, 84  
 Algonkian basin in Hudson Bay: Leith, 10a  
 Analyses: Hunt, 47a, 49, 50, 50a, 52, 52a, 54, 57, 58; Wait, 09  
 Arctic regions: Fitton, 36; Hanbury, 03; O'Neill, 16  
 Bay of Fundy trough: Bailey, 97  
 Bibliography: Ami, 99d, 00g, 01e; Reinecke, 12a; Malcolm, 16  
 Bore-hole records: Ingall, 12  
 Borings, report: Ingall, 12, 15  
 Boulder clays, Great Plains, origin: Dawson (G M), 97b  
 Canadian shield: Coleman, 11  
 Catalog of Geological Survey museum collection: Hoffmann, 93  
 Catalog of minerals, rocks and fossils: Harrington, 78a  
 Caverns: Gibb, 60  
 Chemistry and mineralogy, report on: Hoffmann, 02  
 Climatic changes, in maritime provinces in Quaternary: Matthew (G F), 10; since glacial period in northwestern Canada: Tyrrell, 10  
 Climatic variations: Adams (F D), 10c  
 Department of Mines, organization and work Wilson (A W G), 10a  
 General: Ami, 15; Brock, 09; Dawson (J W), 64, 73b, 77, 80b, 89; Felix, 95; Merciai, 15; Richardson (J), 51; Termier, 13a; Weston, 99; Young (G A), 10a  
 Geological survey: Can Parl, 55; Ells, 95g; Klittke, 97; Langton, 55; Walker (T L), 05  
   history and operations: Dowling, 00d; Ells, 92b, 96f  
   publications: Can G S, 09  
   report, 1857: Logan, 58  
     1863-66: Logan, 66  
     1870-77: Selwyn, 72  
     1878-83: Selwyn, 79  
     1884-93: Selwyn, 85  
     1894-1900: Dawson (G M), 95a  
     1901-1905: Bell (R), 02a  
     1906: Low, 06b  
     1907-1913: Brock, 08  
     1914-15: McConnell, 15  
     1916: McInnes, 17  
   work in 1902: Bell (R), 03  
 Geology and economic minerals: Young (G A), 09  
 Gulf of St. Lawrence, origin: Clarke (J M), 13a  
 Hudson Bay region: Bell (R), 84, 85f  
 Ice bergs, Belle Isle: Dawson (J W), 66b  
 Index to Geological Survey reports: Dowling, 00; Nicolas, 08  
 Mackenzie River region: Camsell, 15a  
 Mines Branch, report: Haanel, 11  
 National parks: Allan, 15a; Camsell, 14  
 Peel River: Isbister, 45  
 St. Lawrence and Ottawa rivers, composition of water: Hunt, 57f

*Economic geology.*

- Apatite: Dawson (G M), 84b; Ells, 04; Hoffmann, 79; origin: McNairn, 10

## Canada—Continued.

*Economic geology—Continued.*

- Asbestos: Anderson (W P), 80; Mollman, 02; Pearson, 12  
 Asbestos deposits, depth of: Cirkel, 09c  
 Building and ornamental stones: Parks (W A), 12a; maritime provinces: Parks (W A), 12  
 Clay resources: Keele, 10a, 12, 12a, b, c, 14b, 18; Ries, 12a  
 Clays and shales, maritime provinces: Keele, 10a; western provinces: Ries, 12c, 13c, 14b  
 Coal: Adams (F D), 87; Baum, 08; Dawson (J W), 58a; Denis, 03a, 12; Dick, 14; Dowling, 11b, c, 12a, b, 13b, 15; Ells, 06d, 08e; Gilpin, 78; Ingall, 00; Mailhiot, 16; Merritt, 93; Pruvost, 13; Young (G A), 09  
   eastern Canada: Gray, 17  
   western Canada: Jacobs, 12; Lakes, 13  
 Copper: Coleman, 10g; Weed, 07; Young (G A), 09; Lake Superior region: Logan, 47b  
 Copper and nickel deposits: Coleman, 10g  
 Corundum: Barlow, 15  
 Diatomaceous earth: Denis, 03  
 Dolomites, composition: Harrington, 94  
 Dolomites and limestones: Hunt, 58  
 Economic minerals: Logan, 52a; Young (G A), 09; localities: Can G S, 50  
 Feldspar: De Schmid, 16  
 Fire-clay deposits: Ries, 13  
 Fuel analyses: Stansfield (E), 18  
 Gems and precious stones: Willimott, 91  
 General: Baddeley, 31, 41; Chapman (E J), 64; Guettard, 56; Harrington, (B J), 78; Hind, 57; Hoffmann, 76, 96, 02; Hunt, 49, 50, 50a, 52, 52a, 54, 65, 66a; Ingall, 02; Logan, 55, 63, 66, 67; Malcolm, 18; Merritt, 84; Rottermund, 57a; Viquesnel, 57; Willimott, 85  
 Gold: Hardman, 98; Miller (W G), 10a, g; Selwyn, 97; Tyrrell, 10d; Young (G A), 09; in pre-Cambrian deposits, origin: Wallace (R C), 18; tellurium ores: Cairnes, 11  
 Gold and silver ores: Miller (W G), 10a  
 Graphite: Brumell, 03, 07, 08; Hoffmann, 78; Lamb, 08; Spence, 18; Young (G A), 09  
 Gypsum: Cole (L H), 13; Hind, 57; Young (G A), 09  
 Gypsum and salt: Cole (L H), 12  
 Hudson Bay: Bell (R), 85  
 Iron: Baum, 08; Billings, 57c; Coste, 88a; Haanel, 10; Harrington (B J), 74; Hunt, 70; Leith, 08; Lindeman, 17; Miller (W G), 10b; Robinson (A H A), 17a; Willmott, 11; Young (G A), 09; Hudson Bay region: Leith, 10a  
 Iron sands: Hunt, 69b  
 Lake Superior region: Logan, 47b  
 Lead: Ingall, 98a; Young (G A), 09  
 Limestones: Donald, 01; composition: Harrington, 94  
 Magnesite: Frechette, 17  
 Manganese: Denis, 03b; Ingall, 91  
 Mica: Cirkel, 04; De Schmid, 12; Young (G A), 09  
 Mineral districts: Frecheville, 09  
 Mineral fuel supply: Ells, 06d, 08a



**Canada—Continued.***Economic geology—Continued.*

- Mineral pigments: Willimott, 06  
 Mineral production: McLeish, 09; Robb, 72a  
 Mineral resources: Bell (R), 86a; Can G S, 76, 86, 00, 01, 04; Dawson (G M), 00a; Frechette, 14; Logan, 62; Malcolm, 18; Roberts-Austen, 98; Willmott, 97; Anon, 82a  
 Mineral statistics: Brumell, 88; Coste, 87, 88; Ingall, 90, 01, 05a  
 Mineral waters: Elworthy, 18  
 Minerals and ores of northern Canada: Tyrrell, 08  
 Mines Branch, report: Haanel, 08  
 Molybdenite: Smith (W H), 15; Wells, 03; Willimott, 04  
 Molybdenum: Johnston (R A A), 04; Walker (T L), 11  
 Moulding sands: Cole (L H), 18  
 Natural gas: Brumell, 88a; Clapp (F G), 13a, 14; Ells 08e; Young (G A), 09  
 Nickel: Hunt, 57a  
 Oil shales: Baskerville, 10; Ells, 09, 10, 10a, b, c  
 Peat: Anrep, 10, 12, 15; Chalmers, 04; Hunt, 64d; Nyström, 09  
 Petroleum: Brumell, 88b, 93; Clapp (F G), 13a, 14; Craig, 14; Ells, 08e; Miller (W G), 17c; Noble, 02; Young (G A), 09; eastern Canada: Ells, 08d  
 Phosphate: Coste, 88a; Millar, 92; Vennor, 82; Wills, 92; Laurentian and Cambrian rocks: Dawson (J W), 76  
 Platinum: Denis, 02; Donald, 93  
 Precious stones: Kunz, 88  
 Quicksilver: Young (G A), 09  
 Pyrites: Wilson (A W G), 12, 12a  
 Radioactive minerals, eastern Canada: Robinson (C W), 15  
 Road materials: Reinecke, 18  
 Salt: Cole (L H), 12, 15; Denis, 03c  
 Sands and sandstones: Cole, 17a  
 Sandstone: Cole (L H), 18a  
 Shale: Keele, 10a, 18; western provinces: Ries, 12c  
 Silver: Miller (W G), 10a; Young (G A), 09  
 Serpentine: Hunt, 57j  
 Slate: Bell (R), 63a  
 Stone: Hind, 57; Parks (W A), 12a  
 Sulphur: Young (G A), 09  
 Tellurium ores: Cairnes, 11  
 Tungsten: Johnston (R A A), 04; Walker (T L), 08, 09; Young (G A), 09  
 Zinc: Ingall, 03b; Young (G A), 09

*Historical geology.*

- Anorthosite areas: Adams (F D), 93  
 Appalachian region: Termier, 13  
 Archean: Lawson, 90a, b; Vennor, 77; eastern Canada: Ells, 97a; classification: Coleman, 02e  
 Arctic regions: O'Neill, 16  
 Belly River beds: Hatcher, 03b  
 Borings: Ingall, 09, 12  
 Cambrian: Barrande, 61a; Marcou, 62b; eastern Canada: Matthew (G F), 01f, 04c  
 Canadian shield, Archeozoic: Adams (F D), 15; geologic history: Coleman, 10b; Proterozoic: Coleman, 15

**Canada—Continued.***Historical geology—Continued.*

- Cordillera: Burling, 18  
 Cretaceous: Whiteaves, 94  
 Devonian system: Whiteaves, 99  
 Eastern Canada: Dawson (J W), 88h  
 Forty-ninth parallel: Dawson (G M), 75  
 General: Ami, 00a, 01h; Bigsby, 27; Billings, 56, 56i; Burling, 14b; Can G S, 76; Chapman (E J), 60, 64, 76, 76a; Dawson (G M), 97; Dawson (J W), 58, 85, 85a, 87; Evans (H F), 03; Haas, 04a; Hunt, 50b, 65, 66a, 67d; Isbister, 55; Logan, 45, 53, 55, 63, 66, 67; Macfarlane, 79; Mackie, 58; Marcou, 53, 55c; Mather, 16, 17c; Selwyn, 84  
 Geologic map: Can G S, 82, 09, 13a; Logan, 69; Selwyn, 84; western Canada: Can G S, 01a  
 Geological cycles in the maritime provinces: Matthew (G F), 08a  
 Geological nomenclature: Ells, 99a  
 Grenville series: Adams (F D), 97  
 Hastings series: Adams (F D), 97  
 Hudson Bay: Bell (R), 85  
 Huronian system: Bell, 89c; Bigsby, 63; Selwyn, 76, 88; Winchell (A), 91a; Winchell (N H), 89g  
 Huronian and Laurentian systems: Whitney, 57  
 Ice sheets in western Canada: Coleman, 10f  
 Intercolonial Railway route: Bell (R), 77a  
 Interglacial periods: Coleman, 07b  
 Laurentian: Adams (F D), 83a, 93; Bigsby, 64; Ells, 94c; Logan, 57b, 65  
   intrusives in, age: Logan, 58a  
   subdivision: Logan, 57b  
 Lower Huronian ice age: Coleman, 07c  
 Lower Silurian horizons: Ulrich, 88a  
 Norian: Lawson, 93f  
 Northern region: Dawson, 87a  
 Ordovician, Atlantic coast region: Matthew (G F), 95b  
 Post-Pliocene: Dawson (J W), 65c, 66c, 71a  
 Post-Tertiary deposits: Tyrrell, 90a  
 Potsdam sandstone: Hunt, 52c  
 Pre-Cambrian: Billings, 57c; Blake (J F), 85; Coleman, 09d, 10b; Dawson (J W), 75, 96a, 97a; Hunt, 84c, 87c, 88; Kinahan, 85; Lawson, 93f; Logan, 57a; Macfarlane, 62; Miller (W G), 09; Ramsay, 65; Tyrrell, 15 b; Wilson (M E), 13a; correlation and nomenclature: Wilson (M E), 18a; nomenclature: Coleman, 06a  
 Pre-Paleozoic surface: Lawson, 90a  
 Quebec group: Dawson (J W), 83f; Hunt, 77a, 90a; Logan, 60a; Selwyn, 87  
 Rocky Mountain region: Dawson (G M), 91a; Hector, 63  
 Section, Laurentian axis to Rocky Mountains: Dawson (G M), 83a  
 Utica slate: Ami, 82a  
 Volcanic rocks in Huronian: Dawson (G M), 94b; in the Keewatin: Selwyn, 94  
 Western Canada: Tyrrell, 10c; Canadian Pacific Railway: Dawson (J W), 84



## Canada—Continued.

*Mineralogy.*

**General:** Bigsby, 24b; Chapman (E J), 60, 54; Harrington (B J), 76, 78; Hoffman, 76, 96, 02; Hunt, 66a; Johnston (R A A), 08, 11, 14; Logan, 63

**List of minerals:** Hoffman, 90, 90a

**Nickel minerals:** How, 77

**Occurrence:** Johnston (R A A), 15

**Precious stones:** Kunz, 88

**Radioactive minerals, eastern Canada:** Robinson (C W), 15

**Report on mineralogy:** Johnston (R A A), 08, 12

**Sundry minerals:** Ferrier, 91, 96a; Harrington (B J), 83a, 87, 90; Hoffman, 01; Hunt, 51c

*Paleontology.*

**Algae (supposed):** Dawson (J W), 86g

**Asaphidae:** Raymond (P E), 13f

**Asteroidea:** Grant (C C), 91

**Asterozoa, Lower Silurian:** Billings, 58b

**Brachiopoda, Ordovician:** Billings, 59b; Silurian and Devonian: Billings, 59a

**Bryozoa:** Ami, 95; Ordovician: Foord, 83

**Cambrian, Cambro-Silurian, and Devonian fossils:** Whiteaves, 06b

**Cambrian, eastern Canada:** Matthew (G F), 01f, 04c, 16

**Cambrian Ostracoda:** Jones (T R), 02

**Cardium, Pleistocene, Hudson's Bay:** Stimpson, 62

**Cephalopoda:** Barrande, 57; Billings, 57d; Whiteaves, 98d

**Cetacea, fossil:** Perkins (G H), 10

**Chazy Brachiopoda and Ostracoda:** Raymond (P E), 11

**Cleioocrinus:** Springer, 05

**Coleoptera:** Scudder, 95a

**Cretaceous:** Whiteaves, 95b

**Cretaceous floras:** Dawson (J W), 88a

**Crinoidea, Lower Silurian:** Billings, 59

**Cyclocystoides:** Salter, 58

**Cystideae, Ordovician:** Billings, 58a

**Devonian:** Billings, 58

**Devonian fishes:** Whiteaves, 07

**Entomostraca:** Jones (T R), 58, 58b, c

**Eozoon:** Archiac, 65; Barker, 74; Carpenter (W B), 65, 65b, 74, 74a, b, 76; Carter (H J), 74, 75; Dawson (J W), 65b, 75, 76e, f, 88b; Hahn, 76; Hauer, 85; Hunt, 65c; Jones (T R), 65; Julien, 84a; King (W), 74, 74a, 76; Logan, 64a; Schultze, 74; Selwyn, 88b

**Etchemian fauna, source:** Matthew (G F), 02b

**Floras of Northwest:** Dawson (J W), 86b

**Fruits, fossil, in the Geological survey museum—Ami, 06c**

**General:** Bigsby, 24b; Chapman (E J), 60, 76; Dawson (J W), 80g; Logan, 63, 67; Mather, 16, 17c; Whiteaves, 87

**Graptolites:** Ami, 96d; Billings, 61b; Hall, 58b, 65

**Isochilinae:** Jones (T R), 03

**Laurentian organic remains:** Logan, 64a, 65

**Laurentian rhizopods:** Hunt, 64a

**Madreporaria Aporosa and Rugosa:** Lambe, 01

**Madreporaria Perforata and Alcyonaria:** Lambe, 99

## Canada—Continued.

*Paleontology—Continued.*

**Mammoth:** Billings, 56m; Lambe, 98

**Mammoth and mastodon, Hudson Bay region:** Bell (R), 98b

**Monocraterion:** Matthew (G F), 01h

**Ordovician:** Billings, 56b, k, 57, 58, 60d, 65, 65b; Salter, 59; Atlantic coast region: Matthew (G F), 95b

**Ordovician and Silurian:** Billings, 60b

**Orthocerata:** Stokes, 38

**Ostracoda:** Jones (T R), 91, 95

**Paleobotany, report:** Wilson (W J), 14

**Paleozoic:** Billings, 58d, 71a

**Paleozoic corals:** Lambe, 99, 99b, 01

**Paleozoic floras:** Dawson (J W), 65e, 82d

**Plantae, Carboniferous:** Dawson (J W), 73

**Devonian and Silurian:** Dawson (J W), 71b  
lignite Tertiary deposits near the forty-ninth parallel: Dawson (J W), 75b

**Plectoceras and Barrandeoceras:** Whiteaves, 06a

**Pleistocene flora:** Dawson (J W), 90; Penhallow, 96; and fauna: Coleman, 99e

**Post-Pliocene climate and plants:** Dawson (J W), 66c, 71a

**Post-Pliocene Mollusca:** Bell (R), 61

**Pre-Cambrian:** Dawson (J W), 96a

**Quaternary:** Billings, 56l

**Report on invertebrate paleontology:** Kindle, 14; Raymond (P E), 11c, 12d; on paleobotany: Wilson (W J), 12; of paleontological division: Lambe, 11a

**Silurian:** Billings, 56k

**Stromatoporoids:** Whiteaves, 96a

**Tetradium:** Raymond (P E), 13g

**Trilobites:** Raymond (P E), 13e

**Type fossils in the Peter Redpath Museum:** Ardley, 16

**Vertebrate paleontology, work on:** Lambe, 03, 05b, 12, 14

*Petrology.*

**Anorthosite rocks:** Adams (F D), 87a

**Catalog of rocks:** Ferrier, 93

**Crystalline rocks:** Hunt, 62e; Logan, 62

**General:** Billings, 56i; Harrington (B J), 76, 78, 79a; Hoffmann, 76, 96, 02; Hunt, 66a; Rottermund, 57a; Viquesnel, 57

**Laurentian rocks, structure and origin:** Adams (F D), 97c

**Limestones, microscopic structure:** Dawson (J W), 59d

**Metamorphic rocks:** Hunt, 57a, c

**Serpentine rocks:** Giroux, 90; Hunt, 57d, j

*Physical geology.*

**Block remains in Rockies and Selkirks:** Sherzer, 07b

**Concretionary structures:** Weston, 92, 96

**Earthquakes:** Perrey, 50; Stupart, 05

July 12, 1861: Dawson (J W), 61e

November 4, 1877: Dawson (J W), 77f

October, 1860: Dawson (J W), 60d

October 20, 1870: Dawson (J W), 70b

1877-1882: Rockwood, 83

1879-1894: Dawson (J W), 94g

1894-97: McLeod, 97



## Canada—Continued.

*Physical geology—Continued.*

- Glaciers, Rockies and Selkirks: Coleman, 17b  
 advance and retreat: Ogilvie, 04a  
 Hudson Bay region, stability: Tyrrell, 00a  
 Ice action: Bleasdel, 70  
 Preglacial decay of rocks: Chalmers, 98b  
 Seismology: Klotz, 10c; Stupart, 03  
 Weathering phenomena: Andrée, 14

*Physiographic geology.*

- Acadia, physiography: Daly, 01  
 Appalachian region of Canada: Termier, 13  
 Archean areas: Wilson (A W G), 05  
 Canadian shield: Coleman, 10b  
 Drift deposits: Richardson (R), 84; Robb, 62  
 Erratics: Bigsby, 51  
 General: Ami, 00a; Bell, 88a; Chapman (E J), 76a; Dawson (G M), 97; Hunt, 65d; Penck, 99; Selwyn, 84  
 Glacial deposits, succession: Bell (R), 93b  
 Glacial drift, distribution: Honeyman, 85e  
 Glaciation: Bell (R), 90a; Belt, 66; Billings, 56l; Crosskey, 66; Dawson (J W), 66b, 83e, 90; Hind, 64; Lyell, 43; Ramsay, 59; Tyrrell, 98a  
 central Canada: Dawson (G M), 75a  
 eastern Canada: Chalmers, 89a  
 northwestern Canada: Tyrrell, 89  
 St. Lawrence Valley: Coleman, 05a  
 Western Canada: Dawson (G M), 78e  
 Great Lake basins: Drummond, 89  
 Gulf of St. Lawrence, origin: Clarke (J M), 13a  
 Ice age: Dawson (J W), 93  
 Laurentian peneplain: Wilson (A W G), 03a  
 Montreal River, diversion: Bell (R), 10  
 Plains, formation: Dowling, 16  
 Preglacial river, northern Canada: Bell, 95b  
 Rocky Mountain region: Dawson (G M), 91a, 01; Wheeler (A O), 10  
 Submerged tributary of preglacial St. Lawrence: Poole, 03c  
 Surficial geology: Dawson (J W), 71a

*Underground water.*

- Mineral springs: Croft, 53; Hunt, 50c, 51a; radioactivity: Satterly, 17  
 Mineral waters: Hunt, 55b, c, 57

Canal Zone. *See* Panama.

- Canandaigua quadrangle, N. Y.: Clarke (J M), 04b  
 Caney shale fauna: Girty, 09b  
 Caney shales, Oklahoma: Woodworth, 12  
 Cannel coal, formation: Newberry, 57a; Illinois, northern: Grout, 07a; United States: Ashley, 05c, 18  
 Cannonball member of Lance formation: Lloyd, 14a  
 Cannonball River lignite field, N. Dak.: Lloyd, 14  
 Canon City coal field Colo.: Washburne, 10a  
 Canton quadrangle, N. Y.: Martin (J C), 16  
 Cantwell formation, Alaska Range: Pogue, 15a  
 Canyon Diablo crater: Merrill (G P), 08  
 Canyons.  
 Character and origin: Bross, 81  
 Colorado, southeastern: Lee (W T), 02c  
 Colorado River of the West: Powell, 75, 95a  
 General: Powell, 75a  
 Glacial: McGee, 83f, 94c  
 New Mexico, northeastern: Lee (W T), 03  
 Unaweep Canyon: Gannett, 82

Cape Breton Island. *See* Nova Scotia.

- Cape Cod, Mass.: Fuller, 06g; Wilson (J H), 06; outline: Davis (W M), 96b

## Cape Hatteras, formation: Shaler, 71

## Cape Lisburne fauna: Girty, 06

## Cape Lisburne region, Alaska: Collier, 06

## Cape Nome gold region, Alaska: Schrader, 00

## Cape Thompson section, Alaska: Kindle, 09c

## Cape Vincent quadrangle, N. Y.: Cushing, 10a

## Carbon Co., Mont.: Darton, 07a

## Carbon minerals, origin: Newberry, 82

Carboniferous. *See also* Paleontology, Carboniferous.

## Alabama: Prouty, 09; Smith (E A), 76; Tuomey, 50

## Birmingham district: Burchard, 10c; Butts, 07, 10a; Gibson, 93

## Cahaba region: Butts, 07c, 11; Smith (E A), 90a

## coal fields: Lyell, 46d; McCalley, 91

## coal pebbles: Prouty, 12a

## Coosa coal field: Smith (E A), 76a

## Fayette district: Munn, 11c, 12c

## Gadsden quadrangle: Hayes, 96

## northeastern: Hayes, 92

## northern: McCalley, 81

## Stevenson quadrangle: Hayes, 95

## Tennessee Valley: McCalley, 96; Smith (E A), 79

## Tuscaloosa field: Lyell, 46a

## Warrior coal field: McCalley, 86, 00; Smith (E A), 79

## Alaska: Brooks (A H), 07; Emerson (B K), 04

## Anvik-Andreafski region: Harrington (G L), 18

## Cape Lisburne region: Collier, 06

## Cape Thompson: Kindle, 09c

## Chisana-White River district: Capps, 16

## Circle quadrangle: Prindle, 13b

## Copper River region: Mendenhall, 03d, 05

## Fairbanks quadrangle: Prindle, 13

## Fortymile quadrangle: Prindle, 09

## Gravina and Revillagigedo islands: Chapin, 18a

## Gulkana-Susitna region: Moffit, 12

## Hanagita-Bremner region: Moffit, 14

## international boundary: Cairnes, 14.

## Ketchikan and Wrangell districts: Wright (F E), 08

## Koyukuk-Chandalar region: Maddren, 13

## Mount McKinley region: Brooks (A H), 11

## Nabesna-White River district: Moffit, 10a

## Nelchina-Susitna region: Chapin, 18

## Noatak-Kobuk region: Smith (P S), 13a

## Porcupine River: Kindle, 08a

## Porcupine to Arctic boundary: Maddren, 12a

## Rampart region: Prindle, 06b

## Rocky Mountains: Schrader, 02

## Seward Peninsula: Collier, 08a

## Solomon and Casadepaga quadrangles: Smith (P S), 10

## southeastern: Kindle, 07

## southwestern: Spurr, 00

## Tolovana district: Mertie, 17

## Yukon, upper: Brooks (A H), 07c, 08a

## Yukon boundary: Cairnes, 12a, 14b

## Yukon-Tanana region: Prindle, 05, 08



## Carboniferous—Continued.

Alberta: Adams (F D), 17b; Malcolm, 13  
 Bighorn coal basin: Malloch, 11  
 Blairmore-Frank coal fields: Leach, 03  
 Cascade coal basin: Dowling, 07  
 Costigan coal basin: Dowling, 05  
 Lake Minnewanka: Shimer, 11, 13  
 Roche Miette area: Dowling, 12  
 Rocky Mountains: Allan, 13; Burling, 16;  
 McConnell, 87  
 Yellow Head Pass region: McEvoy, 00  
 Alleghany coal field: Andrews (E B), 75a;  
 Whittlesey, 74a  
 Allegheny series: White (D), 00a  
 Americus limestone, Kansas: Smith (A J), 01  
 Amsden formation, Wind River Mountains,  
 Wyo.: Branson, 18  
 Anthracolithic rocks of Kansas and adjoining  
 States: Prosser (C S), 10  
 Appalachian and eastern interior coal fields:  
 Ashley, 07a  
 Appalachian basin: Stevenson, 04, 06; Coal  
 Measures sections: White (D), 96c  
 Appalachian region: Stevenson, 92a, 03; north-  
 ern: Ramsay, 96  
 Arctic Archipelago: Haughton, 59  
 Arctic regions: Dawson (G M), 87a; Feilden, 78;  
 McMillan 10; Ellesmere Land: Holte-  
 dahl, 17  
 Arizona: Blake (W P), 01a; Newberry, 61; Ran-  
 some, 16  
 Bisbee quadrangle: Ransome, 04, 04b  
 Clifton quadrangle: Lindgren, 05  
 Clifton-Morenci district: Lindgren, 05a  
 Fort Apache region: Reagan, 03b  
 Globe quadrangle: Ransome, 04a  
 Grand Canyon district: Dutton, 82, 82a;  
 Noble, 14; Schuchert, 18b; Walcott, 83c  
 Kanab Valley: Walcott, 80  
 Little Colorado Valley: Gregory (H E), 14;  
 Ward, 01  
 Mohave Co., Grand Gulch region: Hill (J M),  
 14b  
 Navajo country: Gregory (H E), 17  
 northern: Darton, 10a  
 Ray quadrangle: Ransome, 15b  
 Red Wall formation: Reagan, 04c  
 Salt River valley: Lee (W T), 05  
 Santa Rita and Patagonia Mountains:  
 Schrader, 15  
 southeastern: Dumble, 02  
 southern: Cox (E T), 80b  
 Warren district: Bonillas, 16  
 western: Lee (W T), 08a  
 Arkansan series: Keyes, 01n  
 Arkansas: Branner, 96, 08; Ashley, 97; Collier,  
 07a, b; Lesquereux, 63; Purdue, 09;  
 Smith (J P), 94; Williams (H S), 00a  
 Arkansas River: Warder, 54  
 Batesville region: Penrose, 91  
 Benton Co.: Simonds, 94  
 Boone limestone: Girty, 15c  
 Caddo Gap and De Queen quadrangles  
 Miser, 17  
 Coal Measures: Keyes, 98a; Smith (J P), 96  
 Eureka Springs-Harrison quadrangles: Pur-  
 due, 16

## Carboniferous—Continued.

Arkansas: Fayetteville quadrangles: Adams  
 (G I), 05  
 Fayetteville-Huntsville section: Harris, 91  
 Fort Smith-Poteau field: Smith (C D), 14  
 Hot Springs area: Purdue, 10a  
 Moorefield shale: Girty, 11  
 Morrow group: Mather, 15  
 northern: Adams (G I), 04; Owen (D D), 58;  
 Purdue, 07b; Ulrich, 04; Williams (H S),  
 99a  
 Ozark region: Keyes, 98m  
 Pottsville formations: Mather, 17  
 Washington Co.: Simonds, 91  
 western: Keyes, 95n  
 Winslow quadrangle: Purdue, 07b  
 Aubrey limestone, age: Reagan, 04a  
 Augusta: Keyes, 98c  
 Batesville sandstone: Weller, 97  
 Bedford: Cumings, 01; Siebenthal, 01b  
 Berea formation: Verwiebe, 16  
 Berea grit: Cushing, 88; Orton, 79, 82a, 88c;  
 base: Cushing, 15  
 Bethany limestone, Missouri: Bain, 98f; western  
 interior coal field: Keyes, 96h  
 Black shale: Butts, 13  
 Black Hills region: Hayden, 58; Meek, 58b  
 Bradfordian rocks: Girty, 04e  
 Brecciation, St. Louis limestone: Van Tuyl, 16g  
 British Columbia: Evans (H F), 08a  
 Atlin district: Gwillim, 01  
 Boundary district: LeRoy, 12  
 Coast Range: Camsell, 13a  
 Cranbrook area: Schofield, 15  
 Crowsnest and Flathead areas: Rose, 18  
 Crowsnest Pass coal field: McEvoy, 01a  
 East Kootenay: Schofield, 12, 14  
 Elko to Kootenay Lake: Schofield, 13  
 Flathead area: MacKenzie, 16a  
 Franklin mining camp, West Kootenay:  
 Drysdale, 15  
 Fraser Canyon: Camsell, 12  
 Golden-Kamloops: Daly (R A), 15  
 Hedley district: Camsell, 10a  
 Kamloops area: Dawson (G M), 95  
 Lillooet area: Bateman, 14a  
 Lillooet-Chilko Lake: Bateman, 14  
 Nanaimo and New Westminster districts:  
 LeRoy, 08  
 Nelson area: LeRoy, 12a  
 northern: Whiteaves, 77  
 Rossland: Bruce, 17a; Drysdale, 15a  
 Shuswap lakes region: Daly, 12  
 Skagit Valley, Yale district: Camsell, 12b  
 Thompson River valley: Drysdale, 14  
 Vancouver area: Burwash, 18  
 Vancouver Island: Clapp (C H), 12; Duncan  
 area: Clapp (C H), 14d  
 southern part: Clapp (C H), 14b  
 West Kootenay and Boundary districts:  
 LeRoy, 13  
 Burlington limestone: Niles, 66, 66a; Tarr  
 (W A), 17  
 California: Blake (W P), 68a; Brewer, 68;  
 Smith (J P), 10, 16; Trask, 55b  
 Alleghany district: Ferguson (H G), 14a  
 Bidwell Bay quadrangle: Turner, 98



**Carboniferous—Continued.**

California: Big Trees quadrangle: Turner, 98a  
 Bragdon formation: Diller, 05c  
 Colfax quadrangle: Lindgren, 00  
 Colfax region: Moody, 17  
 eastern: Ball (S H), 07; Spurr, 03  
 Inyo and White Mountains: Knopf, 14a  
 Inyo Range: Kirk, 18  
 Jackson quadrangle: Turner, 94  
 Klamath Mountains: Diller, 03d; Hershey, 06  
 Lassen Peak district: Diller, 89, 95  
 Mother Lode district: Ransome, 00  
 Nevada City and Grass Valley districts: Lindgren, 96b  
 northern: Diller, 86  
 northwestern: Hershey, 01a  
 Placerville quadrangle: Lindgren, 94  
 Redding quadrangle: Diller, 06  
 Sacramento quadrangle: Lindgren, 94a  
 Shasta Co.: Fairbanks, 94e; Smith (J P), 94a  
 Sierra Nevada: Smith (J P), 94b; Turner, 94a, c, 96  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora quadrangle: Turner, 97a  
 Taylorsville region: Diller, 92, 08b  
 Truckee quadrangle: Lindgren, 97  
 Canada: Ami, 00a, 01h; Dowling, 09; Selwyn, 84  
 eastern: Dawson (J W), 55, 88h; Poole, 05  
 maritime provinces: Matthew (G F), 08a  
 Rocky Mountain region: Dawson (G M), 01  
 Cape Breton Island: Brown (R), 47  
 Carboniferous and Permian of America, Russia, and India compared: Schuchert, 06b  
 Carboniferous faunas, relations: Girty, 05a  
 Castile gypsum and Rustler formation, age: Udden, 15b  
 Catskill group: Prosser, 91; Winchell (A), 63  
 Charleston sandstone, W. Va.: Campbell (M R), 03b  
 Chattanooga series, Kinderhook age: Ulrich, 15  
 Chemung group: Winchell (A), 63  
 Chester group: Ulrich, 16a, 17; Weller (S), 13, 16b  
 Chouteau fauna: Weller, 95  
 Chouteau group, Mo.: Rowley 89  
 Chouteau limestone: Keyes, 02h; terranal affinities: Keyes, 16e  
 Cimarron series: Cragin, 97  
 Classification: Keyes, 01h, 06, 14n  
 Coal Measures: Lesley, 61; United States: Hitchcock (C H), 74b; and Europe: White (C A), 75a  
 flora: Lesquereux, 58b  
 water courses: Blandy, 76  
 western interior basin, nomenclature: Keyes, 00h  
 western interior field: Bain, 98  
 Coals west of Mississippi River, names: Keyes, 01  
 Colorado: Finlay, 07a; Girty, 03  
 Alma district: Patton, 12  
 Anthracite-Crested Butte quadrangles: Eldridge, 94  
 Arkansas Valley: Darton, 06f

**Carboniferous—Continued.**

Colorado: Aspen district: Spurr, 98  
 Castle Rock region: Lee (W T), 02b; Richardson (G B), 15  
 central: Peale, 75  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Costilla Co., Grayback district: Patton, 10a  
 Denver Basin: Emmons (S F), 96  
 Elk Mountains: Holmes (W H), 76  
 Engineer Mountain quadrangle: Cross, 10  
 foothills, Permian: Butters, 13  
 Front Range: Hayden, 76  
 Gold Brick district: Crawford, 16  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand River district: Peale, 77, 78  
 Hahns Peak region, Routt Co.: George (R D), 09c  
 Leadville district: Emmons (S F), 82, 86  
 Lykins formation: Girty, 12  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Needle Mountains quadrangle: Cross, 05b  
 north central: Henderson (J), 09  
 North Park: Beekly, 15  
 northern: Ziegler, 17b; red beds: Henderson (J), 08  
 northwestern: Gale 10; White (C A), 78d, 89  
 Ouray quadrangle: Cross, 07a  
 Perry Park: Kruger, 10  
 Pikes Peak sheet: Cross, 94  
 Pueblo quadrangle: Gilbert, 97  
 red beds: Cross, 05c  
 Red Cliff region: Means, 15  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain front range: Darton, 04c  
 Rocky Mountains: Hills, 91c  
 Sangre de Cristo Range: Lee (W T), 02a  
 San Juan district: Endlich, 76  
 San Luis district: Endlich, 74  
 Silverton quadrangle: Cross, 01, 05  
 southern: Endlich, 77; Stevenson, 75, 79, 81  
 southwestern: Cross, 14a  
 Tenmile quadrangle: Emmons (S F), 98  
 Walsenburg quadrangle: Hills, 00  
 western: Cross, 07  
 White River district: Endlich, 78  
 Conemaugh sections in Pennsylvania: Raymond (P E), 09a  
 Conemaugh series: (White), Case, 17a  
 Conglomerate, Appalachian region: Ridgeway, 58  
 Conglomerate series, W. Va.: Fontaine, 76  
 Cordillera, forty-ninth parallel: Daly, 13  
 Correlation: Keyes, 14e; Ulrich, 11a; Williams (H S), 91  
 Fern Glen formation: Weller, 09  
 Guadalupian and Kansas sections: Beede, 10  
 Illinois, Salem limestone: Weller, 08a  
 Kansas and Nebraska: Prosser, 99b  
 Pennsylvania: Butts, 08a  
 Waverlyan period: Bassler, 11d  
 Cumberland basin: Jones (H G), 81  
 Cuyahoga shale: Herrick, 91  
 Definition of Carboniferous: Williams (H S), 91a



## Carboniferous—Continued.

Des Moines series: Keyes, 97e  
 Dunkard formation: White (D), 04a  
 Dunkard series: Stauffer, 16a  
 Equivalence in United States and France:  
   Rogers (H D), 52a  
 Erratic boulders, Coal Measures: McCallie, 03;  
   Taff, 05e  
 Fern Glen formation: Weller, 09, 09c  
 Franklin: Low, 06  
 Fucoid horizons: Broadhead, 71a  
 General: Branner, 97b; Chance, 81b; Cox (E T),  
   71a; Emmons (S F), 93; Girty, 05a;  
   Hall, 57a; Hitchcock (C H), 72c; Keyes,  
   01c; Lesley, 80a, 81, 81a; Marcou, 55g;  
   Meek, 69d; Newberry, 74a; Nicollet,  
   43a; Owen (D D), 43; Schuchert, 13d;  
   Stevens (R P), 62; Stevenson, 88, 06;  
   Taylor (R C), 36; Vogdes, 88; Williams  
   (H S), 91a, 05; Winchell (A), 59  
 Georgia: McCallie, 08, 10; Veatch (J O), 09  
   northern: Maynard, 12  
   northwestern: McCallie, 04; Spencer (J W),  
     93  
   Polk Co.: Spencer (J W), 91a  
   Ringgold sheet: Hayes, 94  
   Rome quadrangle: Hayes, 02  
 Goniatic beds, Rockford, Ind.: Hall, 62a  
 Granite boulders associated with Pennsylvanian  
   strata, Kans.: Twenhofel, 17a  
 Graydon sandstone, southwestern Mo.: Bab-  
   cock, 04  
 Great Basin region: Engelmann, 76  
 Great Plains: Darton, 05; northern: Hayden, 62  
 Greenland: Böggild, 17; northeastern: Grön-  
   wall, 17; Nathorst, 11  
 Guadalupan series: Keyes, 10i  
 Guadalupian and Kansas sections: Beede, 10  
 Guadalupian stratigraphy: Girty, 09a  
 Guatemala: Sapper, 94b  
 Hannibal formation, Mo.: Park, 05a  
 Idaho, Alder Creek district: Umpleby, 14b  
   eastern: Umpleby, 12  
   Lemhi Co.: Umpleby, 13  
   Mackay region: Umpleby, 17  
   phosphate reserve: Richards (R W), 11b  
   southeastern: Gale, 10b; Richards (R W),  
     12, 14a; Schultz, 13, 18  
   Teton Range: Bradley, 72b  
   western central: Lindgren, 00a  
 Illinois: Bain, 08a; Bannister, 70; Blatchley  
   (R S), 10, 11; Blatchley (W S), 06; Bradley  
   70; Broadhead, 75; Cady, 15; Cox (E T),  
   75a; DeWolf, 09; Engelmann, 68; Green,  
   70; Hall, 43c; Kay (F H), 15; Norwood,  
   57; Weller, 06a; White (D), 07a, 09b;  
   Worthen, 66, 68, 68a, 70, 73, 73a, 75a;  
   Young (L E), 16  
   Ava area: St. Clair, 17a  
   Belleville-Breese area: Udden, 08d, 15  
   Birds quadrangle: Rich, 16  
   Bond, Macoupin, and Montgomery cos.:  
     Blatchley (R S), 14  
   Calhoun Co.: Weller, 07c  
   Cap au Gres: Keyes, 98n  
   Carlinville field: Kay (F H), 12  
   Carlyle oil fields: Shaw (E W), 12

## Carboniferous—Continued.

Illinois: Centralia area: St. Clair, 17b  
 Chester group: Weller (S), 13  
 Coal Measures: Stevens, 58a; Worthen, 68b, 75  
 Colchester and Macomb quadrangles: Hinds,  
   14, 17a, b  
 Crawford and Lawrence cos.: Blatchley  
   (R S), 13  
 Danville district: Kay, 15a  
 Danville region: Wegemann, 09  
 Danville quadrangle: Campbell (M R), 09  
 Delafield drill core: Udden (Jon A), 07  
 District VI: Cady, 16  
 Duquoin: Udden (Jon A), 09  
 East St. Louis area: Fenneman, 07a  
 Franklin Co.: Udden (Jon A), 10  
 Gillespie and Mt. Olive quadrangles: Lee  
   (W), 15  
 Herrin quadrangle: Savage, 10; Shaw (E W),  
   12b  
 Jackson Co.: Cady, 17  
 La Salle Co.: Cady, 12; Freeman (H C), 68;  
   Norwood, 58  
 Livingston Co.: Freeman (H C), 75  
 Massac Co.: Shaw (E W), 17c  
 Mazon Creek: Moodie, 12b  
 Mississippian section: Weller, 08b  
 Murphysboro quadrangle: Shaw (E W), 10a,  
   12b  
   northern: Shepard, 38; Udden, 95  
   northwestern: Carman, 09  
   Patoka quadrangle: Fuller, 04  
   Peoria quadrangle: Udden, 08c, 12  
   St. Louis quadrangle: Fennemen, 11  
   St. Louis to Shawneetown section: Nickles, 95  
   Salem limestone: Weller, 08a  
   Saline and Williamson cos.: DeWolf, 08a  
   Saline-Gallatin field: DeWolf, 07  
   Sangamon Co.: Crook, 12a  
   Schuyler and Brown cos.: Morse, 15  
   Shoal Creek limestone: Udden (Jon A), 08  
   southern: Bain, 05b; Bröckaw, 17; Nickles,  
     95a; St. Clair, 17; Mississippian: Engel-  
     mann (H), 63a  
   Springfield, clay seams: Savage, 09a  
   Springfield quadrangle: Savage, 15; Shaw  
     (E W), 13a  
   Starved Rock State Park: Cady, 18  
   Tallula quadrangle: Shaw (E W), 13a  
   Vermilion Co.: Case, 00  
   Vincennes quadrangle: Rich, 16a  
   West Frankfort quadrangle: Cady, 10  
 Indiana: Ashley, 99, 09a; Cox (E T), 69, 71a;  
   Hall, 64c; Hopkins (T C), 04a  
   Bartholomew Co.: Elrod, 82  
   Bedford limestone: Hopkins (T C), 97a, c  
   Benton Co.: Gorby, 86  
   Bloomington quadrangle: Beede, 15  
   Brown Co.: Collett, 75  
   Clark and Floyd cos.: Borden, 74  
   Clay Co.: Collett, 76a  
   Coal Measures: Lesquereux, 62  
   Crawford Co.: Collett, 79  
   Ditney quadrangle: Fuller, 02  
   Dubois Co.: Collett, 72  
   Flatwoods region, Owen and Monroe cos.:  
     Malott, 15



## Carboniferous—Continued.

Indiana: Fountain Co.: Brown (R T), 82  
 Gibson Co.: Collett, 74c  
 Goniatite limestone: Christy, 51  
 Greene Co.: Van Gorder, 16  
 Harrison Co.: Collett, 79  
 Huron group: Greene (F C), 11a  
 Jackson Co.: Cox (E T), 75  
 Jasper Co.: Collett, 83b  
 Johnson Co.: McCaslin, 84  
 Keokuk group: Beachler, 88  
 Knobstone group: Bennett (L F), 98; Jones (L H), 98; Newsom, 03  
 Knox Co.: Collett, 74b  
 Lawrence Co.: Collett, 74a  
 Monroe Co.: Greene (G K), 80; Reagan, 04  
 Montgomery Co.: Collett, 76  
 Morgan Co.: Brown (R T), 84  
 New Albany region, Knobstone group: Newsom, 98b  
 oolitic limestone: Siebenthal, 08  
 Orange Co.: Elrod, 76; Kindle, 96a  
 Owen Co.: Collett, 76  
 Parke Co.: Hobbs (B C), 72  
 Patoka quadrangle: Fuller, 04  
 Perry Co.: Cox (E T), 72; Lesley, 62  
 Pike Co.: Collett, 72a  
 Posey Co.: Collett, 84a  
 Putnam Co.: Collett, 76b, 80a  
 Salem limestone: Cumings, 06  
 Scott Co.: Borden, 75  
 southern: Kindle, 99; Newsom, 03  
 southwestern: Ashley, 00  
 Sullivan Co.: Collett, 71  
 Tippecanoe Co.: Gorby, 86  
 Vanderburgh Co.: Collett, 76  
 Vigo Co.: Cox (E T), 76; Scovell, 97  
 Warren Co.: Collett, 74  
 Washington Co.: Gorby, 86  
 western: Hopkins (T C), 96, 96d  
 Iowa: Beyer, 06, 07b; Calvin, 06a; Hall, 58; Keyes, 88b, 93a, 94, 12f, 13e; Norton, 12; St. John, 70a; White (C A), 68c, 70  
 Appanoose Co.: Bain, 96c  
 Benton Co.: Savage, 05a  
 Bethany limestone: Tilton, 13b  
 Boone Co.: Beyer, 96  
 Burlington: White (C A), 60; "Chemung": White (C A), 62  
 Burlington limestone: Fultz, 94  
 Butler Co.: Arey, 10  
 Carroll Co.: Bain, 99a  
 central: Keyes, 91  
 Cerro Gordo Co.: Calvin, 97a  
 Clinton Co.: Udden (Jon A), 05  
 Dallas Co.: Leonard, 98  
 Davis Co.: Arey, 10c  
 Decatur Co.: Bain, 98a  
 Des Moines region: Keyes, 91c, 95d  
 Des Moines stage, general section: Lees, 09  
 Des Moines Valley: Worthen, 58  
 eastern: Carman, 09  
 eastern outliers: Norton, 95  
 Franklin Co.: Williams (I A), 03  
 Fremont Co.: Udden, 03  
 Guthrie Co.: Bain, 97c  
 Grundy Co.: Arey, 10a

## Carboniferous—Continued.

Iowa: Gypsum region: Keyes, 95b  
 Hamilton and Wright cos.: Macbride, 10  
 Hardin Co.: Beyer, 00  
 Harrison and Monona cos.: Shimek, 10  
 Humboldt Co.: Macbride, 99; Humboldt: Sardeson, 02a  
 Henry Co.: Savage, 02  
 Iowa Co.: Stookey, 10  
 Jackson Co.: Savage, 06a  
 Jasper Co.: Williams (I A), 05  
 Jefferson Co.: Udden, 02  
 Jones Co.: Calvin, 96  
 Johnson Co.: Calvin, 97  
 Keokuk beds: Gordon (C H), 90a, d  
 Keokuk Co.: Bain, 95c  
 Kinderhook: Calvin, 88d  
 Lee Co.: Keyes, 95c  
 Louisa Co.: Udden, 01  
 Madison Co.: Tilton, 97  
 Mahaska Co.: Bain, 95d; St. Louis limestone: Bain, 93  
 Marion Co.: Miller (B L), 01  
 Marshall Co.: Beyer, 97a  
 Middle River section: Tilton, 95  
 Mills Co.: Udden, 03  
 Mississippian series: Bain, 95g  
 Monroe Co.: Beyer, 03  
 Montgomery Co.: Lonsdale, 95  
 Muscatine Co.: Calvin, 88d; Udden, 99  
 northeastern: McGee, 91  
 Page Co.: Calvin, 01; Keyes, 01  
 Polk Co.: Bain, 97b  
 Pottawatamie Co.: Udden, 01a  
 Poweshiek Co.: Jones (A J), 94; Stookey, 10a  
 Raccoon River regions: St. John, 68a  
 Scott Co.: Norton, 99; Tiffany, 85  
 southeastern: Gordon (C H), 95c; Van Tuyl, 12; Ste. Genevieve: Weller, 15a  
 southwestern: Keyes, 98e; Lonsdale (E H), 95b; Smith (G L), 09, 15, 16; Todd, 90b; White (C A), 67d  
 Story Co.: Beyer, 99b  
 Tama Co.: Savage, 03  
 Van Buren Co.: Gordon (C H), 95a  
 Wapello Co.: Leonard, 02  
 Warren Co.: Tilton, 96  
 Washington Co.: Bain, 96a  
 Wayne Co.: Arey, 10b  
 Webster Co.: Wilder, 02  
 Kanawha black flint: White (I C), 02a  
 Kanawha series: White (D), 00a  
 Kansas: Adams (G I), 02c, 03; Beede, 98f, 99, 09a; Broadhead, 81b; Engelmann (H), 58; Haworth, 95d, 98, 08d; Hay (R), 93a; Hayden, 59; Keyes, 00b; Meek, 59b, 65b; Moore (R C), 17; Mudge, 66, 75b, 78; Prosser, 97c, 02a; St. John, 83c; Schiel, 55; Swallow, 58d, 59b, 66, 68; West, 85; Wooster, 00, 05a, 06  
 Atchison-Barnes: Knerr, 96  
 Baxter Springs-Nebraska: Haworth, 96a  
 Bourbon Co., Yates Center: Bennett (J), 96  
 Burlington: Parker (J D), 84a  
 central: Perrine, 18; Prosser, 95a  
 Cherryvale-Lawrence section: Haworth, 94d



## Carboniferous—Continued.

Kansas: Coal Measures: Beede, 08; Haworth, 95, 95b; Keyes, 95j  
 Coffeyville-Lawrence: Haworth, 96b  
 Cottonwood limestone: Yates, 11  
 Cottonwood Falls quadrangle: Prosser, 04  
 eastern: Broadhead, 84b; Haworth, 94e; Swallow, 67; Wooster, 05  
 Emporia: Wooster, 88  
 Flint Hills: Gould, 96  
 Fort Riley Reservation: Hay (R), 96  
 Fort Scott-Boone interval: Berger, 18  
 Galena-Wellington: Adams (G I), 96a  
 gas and oil fields: Adams (G I), 01a  
 Greenwood and Butler cos.: Wooster, 90  
 gypsum area: Grimsley, 97a  
 Independence quadrangle: Schrader, 06a, 08  
 Iola gas field: Orton, 99b  
 Iola quadrangle: Adams (G I), 04c  
 Joplin district: Smith (W S T), 07a  
 Kansas City-McFarland: Bennett (J), 93  
 Kansas River section: Prosser, 94  
 Lawrence shales: Yates, 09  
 Leavenworth quadrangle: Hinds, 17  
 Lyon Co.: Smith (A J), 03  
 Manhattan-Abilene: Adams (G I), 96a  
 Marion and Wellington formations: Gould, 01f  
 Miami Co.: Swallow, 65, 66  
 Neosho and Cottonwood rivers section: Haworth, 94b; Kirk, 96  
 Neosho River section: Beede, 06b  
 northern, Dakota-Permian contact: Greene (F C), 10  
 Osage River: Hall (J G), 96  
 Ottawa-Holliday section: Haworth, 94d  
 Permian: Beede, 05, 09; Cragin, 96a; Meek, 58a, 64f; Prosser, 05b; Swallow, 58c; upper: Prosser, 97b  
 Reading blue limestone: Smith (A J), 05  
 red beds, age: Williston, 99f  
 Shawnee Co.: Beede, 98  
 Silver City area: Twenhofel, 17  
 southeastern: Haworth, 82  
 southern: Prosser, 97d  
 southwestern: Hay (R), 90  
 Verdigris River section: Haworth, 94c  
 Kaskaskia group: Miller (S A), 79b  
 Kentucky: Christy, 48; Lesley, 58a; Lesquereux, 61a; Lyon, 60b; Miller (A M), 09; Owen (D D), 56; Worthen, 71a  
 Bath Co.: Linney, 86  
 Bedford formation: Foerste, 09a  
 Big Stone Gap coal field: Campbell (M R), 93  
 Black Mountain district: Dilworth, 12  
 Blue Grass region: Matson, 09  
 Campton field: Munn, 12a  
 central: Kindle, 99; Owen (D D), 47a; connection of coal fields: Miller (A M), 09; Shaler, 87a  
 Chattanooga shale: Kindle, 12a  
 Chattanooga series: Ulrich, 12  
 Clay and Knox cos.: Hodge (J M), 14a  
 Clinton Co.: Loughridge, 90  
 Cumberland Gap: Ashley, 06  
 Cumberland Mountain region: Moore (P N), 78a

## Carboniferous—Continued.

Kentucky: Dawson Springs quadrangle: Crider, 14  
 Drakesboro quadrangle: Crider, 15a  
 Dunmor quadrangle: Crider, 15b  
 Earlington quadrangle: Crider, 14a  
 eastern: Crandall, 80a; Lesley (J), 61, 73; Lesley (P J), 65a; Lyon, 57; Miller (A M), 08, 10  
 Edmonson Co.: Bryant (J O), 14  
 Elkhorn district: White (D), 08a  
 Elkhorn field: Stone, 07  
 Elliott Co.: Crandall, 87a  
 Estillville quadrangle: Campbell (M R), 94  
 Fleming Co.: Linney, 86  
 Garrard Co.: Linney, 83  
 Grayson Co.: Bryant (J O), 14  
 Greenup, Carter, and Boyd cos.: Crandall, 77  
 Hartford quadrangle: Gardner (J H), 12  
 Irvine field: Shaw (E W), 17  
 Jefferson Co.: Butts, 15  
 Kenova quadrangle: Phalen, 08a, 12  
 Kentucky River region: Hodge (J M), 10  
 Knox Co.: Munn, 12b  
 Lincoln Co.: Linney, 83a  
 Little Black Mountain region: Fisher (C A), 09b  
 Little Muddy quadrangle: Crider, 15c  
 London quadrangle: Campbell (M R), 98a  
 Louisville region: Yandell, 47  
 Marion Co.: Knott, 85  
 Menifee Co.: Crandall, 78  
 Montgomery Co.: Linney, 85  
 Nelson Co.: Linney, 84  
 Nolin River district: Moore (P N), 77  
 Nortonville quadrangle: Crider, 15  
 Ohio Co.: Norwood, 80  
 Owensboro quadrangle: Crider, 13  
 Perry Co.: Hodge (J M), 14, 14b  
 Pineville Gap: Crandall (A R), 12  
 Pottsville series: Campbell (M R), 00b  
 Pound quadrangle: Butts, 14  
 Pound Gap region: Crandall (A R), 87  
 Red River region: Moore (P N), 78  
 Richmond quadrangle: Campbell (M R), 98  
 Rockcastle Co.: Stevens (R P), 74d  
 Shawneetown quadrangle: Lee (W), 16  
 Tell City quadrangle: Crider, 13  
 Tradewater River region: Glenn, 12  
 Union Co.: Lyon, 56  
 Waverly formation: Morse (W C), 09, 12  
 Wayne Co.: Munn, 14a  
 Webster Co.: Glenn, 12a  
 west central, Mississippian section: Butts, 16  
 western: Butts, 17b; Hutchinson, 12; Lyon, 57; Norwood, 75, 78; Owen (D D), 57, 57a; Ulrich, 05; Chester series: Ulrich, 17  
 western coal field, eastern border: Moore, (P N), 78e  
 Whitley Co.: Crandall, 91  
 Wolfe and Breathitt cos.: Moore (P N), 78c  
 Keokuk beds, Keokuk, Iowa: Gordon, 90a  
 dip at Bloomington, Ind.: Kindle, 95  
 Keokuk group: Beachler, 92a; Crawfordsville, Ind.: Beachler, 88  
 Kinderhook beds, Burlington: Weller, 00b



## Carboniferous—Continued.

Kinderhook formations, Mo.: Weller, 01b  
 Kinderhook group: Meek, 61; Moore (R C), 17a;  
     lower: Branson, 18b  
 Kinderhook stratigraphy: Keyes, 00, 00c  
 Knobstone formation: Springer, 11  
 Knobstone group, Ind.: Bennett (L F), 98, 99;  
     Jones (L H), 98; Newsom, 98b, 99a;  
     Price (J A), 98  
 McAlister coal group, age: White (D), 98b  
 Maine, southwestern: Katz, 17a  
 Marshall group: Winchell (A), 68, 69a  
 Maryland: Clark (W B), 97b, 05b, 06c; Martin  
     (G C), 05; Ries, 02a; White (D), 02a  
     Accident and Grantsville quadrangles: Mar-  
     tin (A H), 08  
     Alleghany Co.: O'Harra, 00; Prosser, 01b  
     Coal Measures: Clark (W B), 02c, e, 05a  
     Garrett Co.: Martin (G C), 02  
     Pawpaw and Hancock quadrangles: Stose,  
     12b  
     Piedmont quadrangle: Darton, 96b  
 Massachusetts: Crosby, 80d; Emerson (B K),  
     17; Hitchcock (C H), 61c; Hitchcock (E),  
     41; Loughlin, 14b; Packard (A S), 98a  
     Boston region: LaForge, 09; Blue Hills area:  
     Crosby, 00  
     Brockton: Fuller, 96  
     coal field: Hitchcock (E), 53a  
     Diamond Hill-Cumberland district: Warren  
     (C H), 14  
     Narragansett Basin: Shaler, 99  
     Neponset Valley: Crosby, 05c  
     Norfolk Co.: Barton, 81; Woodworth, 94b  
     Roxbury conglomerate: Mansfield, 06a; gla-  
     cial origin: Sayles, 10  
     Squantum tillite: Sayles, 14, 14a  
     Worcester: Perry (J H), 85, 03  
 Maxville limestone, Ohio: Lamb, 16  
 Mercer group, age: White (D), 03d  
 Mexico, Chiapas and Tabasco: Böse, 05; Sapper,  
     96a  
     Coahuila: Haarman, 13  
     northern: Rémond, 66  
     Puebla: Ramirez, 83i  
     Sonora: Dumble, 00a  
     Yucatan: Sapper, 96  
 Michigan: Cook (C W), 14; Grimsley, 04; Lane,  
     02g, 09a; Winchell (A), 61  
     alabaster area: Gregory (W M), 04  
     Ann Arbor quadrangle: Russell (I C), 08  
     Arenac Co.: Gregory (W M), 12  
     Bay Co.: Cooper (W F), 06  
     Detroit district: Sherzer, 17  
     Grand Rapids, Mississippian: Whittemore,  
     00  
     Huron Co.: Lane, 00  
     Lower Peninsula: Lane, 95; Rominger, 76;  
     Winchell (A), 76  
     Marshall group: Winchell (A), 62  
     Sanilac Co.: Gordon, 00  
     Tuscola Co.: Cooper (W F), 09  
     Wayne Co.: Sherzer, 13  
 Mississippi: Crider, 06, 06b, 07; Harper, 57;  
     Hilgard, 60; Lieber, 54; Logan, 07; Lowe,  
     15

## Carboniferous—Continued.

Mississippi Valley: Hall, 57d, 64c; Keyes, 96i,  
     97b, 01a, e, f; Nicollet, 43; Owen (D D),  
     46; Prout, 48; upper: Owen (D D), 52  
 Mississippian: Keyes, 98c, 00; Meek, 61  
     Appalachian region: Stevenson, 03  
     classification: Keyes, 92  
     Mississippi Valley: Van Tuyl, 18a; Weller (S),  
     14  
     southern Indiana: Ashley, 03; Hopkins (T C),  
     03a  
     western Kentucky: Butts, 17b; Ulrich, 05  
 Mississippian section: Keyes, 92a  
 Mississippian series, classification: Keyes, 98f;  
     Weller, 98c  
 Mississippian - Pennsylvanian unconformity:  
     Lamb, 11  
 Missouri: Branson, 18a; Broadhead, 93b; Buck-  
     ley, 04; Gallaher, 00; Hall, 43c; Keyes, 02,  
     13e; King (H), 51; Maughas, 53; Shepard,  
     07; Swallow, 55a, 58; Winslow, 95  
     Adair Co.: Broadhead, 74  
     Andrew Co.: Broadhead, 74  
     Atchison Co.: Broadhead, 73a  
     Barton Co.: Broadhead, 74  
     basal beds: Keyes, 92c  
     Bates Co.: Broadhead, 74  
     Belton area: Wilson (M E), 18  
     Bevier sheet: Gordon, 93  
     Boone Co.: Broadhead, 98  
     Buchanan Co.: Broadhead, 73a  
     Calhoun sheet: Marbut, 98  
     Cedar Co.: Broadhead, 74  
     Chouteau group: Rowley, 89  
     Clark Co.: Shumard (B F), 73  
     Clay Co.: Broadhead, 73a  
     Clinton sheet: Marbut, 98  
     Coal Measures: Broadhead, 66, 95; Winslow,  
     91a, 92c; thickness: Broadhead, 77a  
     Cole Co.: Broadhead, 74  
     Copper Co.: Swallow 55b  
     Davies Co.: Broadhead, 74  
     east central: Broadhead, 73d  
     Granby area: Buckley, 06  
     Greene Co.: Shepard, 98, 15; Hannibal forma-  
     tion: Park, 05a  
     Henry Co.: White (D), 97  
     Higginsville sheet, Lafayette Co.: Winslow,  
     92  
     Holt Co.: Broadhead, 73a  
     Howard Co.: Broadhead, 74; Norwood (C J),  
     74b  
     Huntsville quadrangle: Marbut, 98  
     Jackson Co.: Broadhead, 78b; McCourt, 17  
     Jasper Co.: Broadhead, 74; Norwood (C J), 74  
     Jefferson Co.: Shumard (B F), 73  
     Joplin district: Smith (W S T), 07a  
     Kinderhook, Glen Park: Weller, 06, 09  
     Leavenworth quadrangle: Hinds, 17  
     Lexington area: Marbut, 98  
     Lincoln Co.: Potter, 73  
     Linn Co.: Broadhead, 74  
     Livingston Co.: Broadhead, 73a  
     Macon Co.: McGee, 88b  
     Marion Co.: Swallow, 55d  
     Miller Co.: Ball, 03; Meek, 73c



## Carboniferous—Continued.

Missouri: Moniteau Co.: Meek, 55; Van Horn, 05  
 Morgan Co.: Marbut, 08; Meek, 73c  
 Nodaway Co.: Broadhead, 73a  
 northeastern: Greene (F C), 14; Keyes, 92d  
 northern: Hawn, 55  
 northwestern: Broadhead, 73  
 Ozark Mountains: Keyes, 95g  
 Ozark region: Ball (S H), 04; Crane (G W), 12; Keyes, 98m  
 Pennsylvanian series: Hinds, 15  
 Perry Co.: Shumard (B F), 73  
 Pike Co.: Rowley, 91, 08; Burlington: Rowley, 91b  
 Platte Co.: Broadhead, 73a  
 Providence: Stewart (A), 96  
 Putnam Co.: Norwood (C J), 74c  
 Richmond quadrangle: Marbut, 98  
 Rolla quadrangle: Lee (W), 14  
 Ste. Genevieve Co.: Shumard (B F), 59 b, 73; Worthen, 60a  
 St. Louis Co.: Shumard (B F), 55  
 St. Louis quadrangle: Fenneman, 11  
 Saline Co.: Meek, 73c  
 Schuyler Co.: Norwood (C J), 74b  
 Sedalia, Mississippian: Sampson, 88  
 Smithville quadrangle: Hinds, 17  
 southeastern: Shumard (B F), 55  
 southern: Hughes, 11  
 Southwest Pacific Railroad line: Swallow, 59a  
 Sullivan Co.: Broadhead, 74  
 Vernon Co.: Broadhead, 74  
 western: Keyes, 95n  
 Wright Co.: Shumard (B F), 73  
 Missouri River region: Hayden, 57  
 Missourian series: Keyes, 99a  
 Montana: Hayden, 72, 76b; Meek, 73; Walcott, 08a  
 Big Horn Mountains: Darton, 06e  
 Birch Creek-Sun River region: Stebinger, 18  
 Bowdoin dome: Collier, 17  
 Cascade Co.: Barnett, 16  
 Castle Mountain district: Weed, 96a  
 Cleveland field: Bowen (C F), 14a  
 Dillon quadrangle: Winchell (A N), 14  
 Electric coal field: Calvert, 12b  
 Elkhorn district, Jefferson Co.: Weed, 01  
 Elkhorn Mountains: Stone (R W), 11  
 Elliston field: Stone (R W), 14  
 Fort Benton quadrangle: Weed, 99  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg fields: Pardee, 17  
 Great Falls region: Fisher (C A), 09, 09a; Weed, 92  
 Helena region: Knopf, 13  
 Judith Mountains: Weed, 98  
 Lewis and Livingston ranges: Willis, 02  
 Lewistown field: Calvert, 09a  
 Little Belt Mountains: Weed, 99a, 00  
 Little Rocky Mountains: Weed, 96b  
 Livingston quadrangle: Iddings, 94  
 northeastern: Collier, 18a  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Three Forks region: Haynes, 16a; Peale, 93, 96

## Carboniferous—Continued.

Montana: Southern: Dana (E S), 76  
 southwestern: Condit, 18; Douglass, 05a  
 western: Pardee, 13  
 Moorefield shale of Arkansas: Girty, 11  
 Nebraska: American Bur. Mines, 66; Aughey, 80; Barbour, 03, 12; Beede, 99; Egleston, 66c; Geinitz, 67; Hayden, 62, 67; Marcou, 64; Meek, 65b; Pepperberg (R V), 10, 10a; Prosser, 97c  
 Brownville: Hicks, 85  
 Cass Co. Woodruff, 06  
 Republican River valley: Condra, 07  
 eastern: Marcou, 67a; Meek, 72  
 Nebraska City: Beede, 98f  
 Pennsylvanian formations: Condra, 15  
 Permian: Knight (W C), 99a; Marcou, 68  
 southeastern: Darton, 98; Meek, 67e  
 Nevada: Meek, 60a; Spurr, 03  
 Egan Canyon district: Emmons (S F), 70  
 Ely district: Spencer (A C), 17  
 Esmeralda Co.: Turner, 02  
 Eureka district: Hague, 83, 92  
 northeastern: Emmons (W H), 10  
 Robinson district: Lawson, 06  
 southwestern: Ball (S H), 07  
 Toyabe Range: Emmons (S F), 70  
 White Pine district: Hague (A), 70  
 Yellow Pine district: Hill (J M), 14a  
 New Brunswick: Ami, 00k; Bailey, 90a, 02; Credner, 65; Dawson (J W), 55, 66; Ells, 01c, 06c, 08a; Gesner, 43; Gilpin, 83; Hind, 65; Hitchcock (C H), 65; Keele, 14; Poole, 03; Rogers (W B), 59d; Stopes, 12; Wilson (W J), 09a  
 Bathurst district: Young, 11a  
 Burnthill Brook area: Young (G A), 18  
 Chignecto Bay: Poole, 03b  
 Curries Mountain: Bailey (L W), 10a  
 Eastern: Ells, 83  
 Moncton area: Young, 12  
 northern: Bailey, 87; Ells, 81, 83  
 northwestern: Robb, 72  
 St. John Co.: Matthew (G F), 63  
 St. John plant beds: Matthew (G F), 01b; Stopes, 14  
 southeastern: Ells, 85a  
 southern: Bailey, 65, 72, 73, 80; Matthew, (G F), 65c  
 volcanic rocks: Bailey, 05a  
 western: Bailey, 86; Robb, 70  
 Newfoundland: Murray, 73a, 80, 81; Weston, 96a  
 Bay of St. George region: Howley, 90  
 Humber Valley: Howley, 93  
 Port au Port and St. George bays: Howley, 75  
 St. George's Bay: Gilpin, 74a  
 southwestern: Murray, 67  
 western coast: Murray, 68a  
 New Hampshire, Monadnock Mountain: Perry (J H), 04  
 southeastern: Katz, 17a  
 New Mexico: Case 13a; Gordon (C H), 06; Herrick, 04c; Huene, 11; Keyes, 05i, 06a; Lindgren, 10; Marcou, 89f; Newberry, 61  
 Burlington limestone: Springer, 84



## Carboniferous—Continued.

New Mexico: Carboniferous coal measures in the Sierra Ladrones: Keyes, 06f  
 central: Lee (W T), 08b  
 Coal Measures: Herrick, 00  
 Deming quadrangle: Darton, 17  
 Estancia Plains: Keyes, 08b  
 Estancia Valley: Meinzer, 11  
 Guadalupe Mountains, Permian: Shumard (B F), 58  
 Hanover district: Paige, 09  
 Jemez-Albuquerque region: Reagan, 03  
 Jornada del Muerto: Keyes, 05; Shumard (G G), 59  
 Lake Valley district: Keyes, 08  
 red beds, age: Lee (W T), 08c  
 Luna Co.: Darton, 16  
 Manzano group: Lee (W T), 09b  
 northeastern: St. John, 76  
 northern: Stevenson, 79, 81; Williston, 12c  
 northwestern: Darton 10a; Dutton, 85  
 Permian: Herrick, 00c; Pecos Valley: Wra-ther, 17  
 Rio Grande Valley: Gordon (C H), 07, 07a; Keyes, 09m; Lee (W T), 07c; red beds: Case, 16  
 Roswell area: Fisher (C A), 06b  
 San Miguel Co.: Gardner (J H), 19d  
 Santa Fe region: Blake (W P), 59b  
 Sierra Blanca field: Wegemann, 14  
 Silver City quadrangle: Paige, 16  
 Socorro: Herrick, 04  
 Socorro and Valencia cos.: Herrick, 00a  
 southeastern: Richardson (G B), 10a  
 southern: Darton, 17a  
 Tijeras region: Herrick, 98c  
 Tularosa Basin: Meinzer, 15  
 New York: Clarke (J M), 03g; Hartnagel, 12  
 Olean section: Clarke (J M), 03c  
 southwestern: Glenn, 03  
 western: Hall, 43  
 Nomenclature: Keyes, 96f, 14e; Kansas Coal Measures: Haworth, 08  
 North America: Smith (J P), 03; Willis, 12  
 Nova Scotia: Ami, 00b, f, k; Dawson (J W), 43, 45, 66, 68a, 74a, 79c; DeWolfe, 06; Ells, 01d; Fletcher, 00b, 02a; Gesner, 36; Gilpin, 83; Hartt, 67; Honeyman, 72; Hyde, 13, 14, 15; Logan, 42; Lyell, 43d; Malcolm, 12; Matthew (G F), 01e, 02c; Rogers (W B), 59d; White (D), 01b, 02c  
 Antigonish Co.: Honeyman, 66, 76a, 86b  
 Arisaig-Antigonish district: Williams (M Y), 11, 12, 14  
 Boisdale Hills: Boright, 04  
 Cape Breton Island: Brown (R), 71; Dawson (J W), 49a, 63a; Fletcher, 77, 78, 79, 85; Gilpin, 86c, d; Lesley, 63; Robb, 76  
 Chignecto Bay: Poole, 03b  
 Clyburn Valley: Wright (W J), 14b  
 Coal Measures: Poole, 63  
 conglomerate: Gilpin, 91  
 Cumberland: Poole, 08a; Woodman, 07a  
 Cumberland Co.: Ami, 00c  
 eastern: Fletcher, 81, 87  
 Gaspereau Valley: Haycock, 02

## Carboniferous—Continued.

Nova Scotia: Joggins section: Bell (R), 13; Bell (W A), 12, 14; Logan, 45c  
 Kings and Hants cos.: Fletcher, 02  
 Kings Co.: Honeyman, 79a  
 northern: Ells, 85a  
 Northumberland Co.: Fletcher, 08a  
 Pictou and Colchester cos.: Fletcher, 92  
 Pictou coal field: Honeyman, 72b; Poole, 93, 04  
 Pictou Co.: Ami, 02; Gilpin, 86a, 88; Hartley, 70; Honeyman, 80b; Logan, 70  
 South Joggins: Dawson (J W), 54  
 Strait of Canso: Hyde, 14a  
 Sydney coal field: Brown (R), 50; Fletcher, 94, 96, 00a; Hudson (J G S), 13  
 Union and Riversdale formations: Ami, 02c, 03c  
 Windsor-Horton: Bell (R N), 13  
 Ocoee slates: Smith (E A), 03a  
 Ohio: Bownocker, 15, 17; Hall, 43c; Haseltine, 02; Hildreth, 38; Lamb, 10; Mather, 38d; Newberry, 71, 73, 74a, 78; Orton, 82, 82a, 88, 93a, c; Prosser, 01c, 05; Stevenson, 06  
 Allegheny coal field: Whittlesey, 54a  
 Ashland Co.: Read, 78a  
 Ashtabula, Lake, Geauga, and Trumbull cos.: Read, 73  
 Bedford and Berea formations: Burroughs, 13; ripples: Hyde, 11a  
 Bedford-Berea disconformity: Burroughs, 11; Prosser, 12  
 Belmont Co.: Stevenson, 78  
 Carroll Co.: Stevenson, 78  
 Chattanooga series: Ulrich, 12  
 Cleveland shale: Hicks, 78; age: Cushing, 12  
 Coal Measures: Lesquereux, 52; Stevens, 58a; Stevenson, 73; White (I C), 91; lower: Orton, 84, 84a  
 Columbiana Co.: Newberry, 78a  
 Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Conemaugh formation: Condit, 09, 12a; Mark, 12  
 Coshocton Co.: Hodge (J T), 78  
 Crawford Co.: Winchell (N H), 74  
 Cuyahoga Co.: Newberry, 73a  
 Cuyahoga shale: Herrick, 91  
 Defiance Co.: Winchell (N H), 74  
 Delaware Co.: Winchell (N H), 74  
 desiccation conglomerates: Hyde, 08  
 Dunkard series: Stauffer, 16a  
 eastern: Orton, 80  
 Erie Co.: Newberry, 74b  
 Fairfield, Co.: Hyde, 12  
 Flint Ridge: Herrick, 87; Mark, 16  
 Flushing quadrangle: Griswold, 08  
 Franklin, Co.: Orton, 78a  
 Geauga Co.: Read, 71  
 Guernsey Co.: Stevenson, 78  
 Harrison Co.: Stevenson, 78  
 Henry Co.: Winchell (N H), 74  
 Holmes Co.: Read, 71, 78a; Wright (A A), 84  
 Huntington quadrangle: Campbell (M R), 00  
 Huron Co.: Read, 78  
 Jefferson Co.: Newberry, 78b



## Carboniferous—Continued.

Ohio: Kenova quadrangle: Phalen, 08a, 12  
 Knox Co.: Read, 78  
 Licking Co.: Carney, 06, 09; Herrick, 87; Read, 78  
 Lorain Co.: Newberry, 74b  
 Mahoning Co.: Newberry, 78b  
 Maxwell limestone: Morse, 10, 11  
 Medina Co.: Wheat, 78  
 Mercer limestone: Mark, 11  
 Mississippian: Andrews (E B), 71c  
 Morrow Co.: Winchell (N H), 74  
 Muskingum Co.: Foster, 38; Stevenson, 78; Stout, 18  
 northeastern: Newberry, 71b; Prosser, 12a; Whittlesey, 51b  
 Ohio shale: Orton, 88d  
 Perry Co.: Andrews (E B), 79  
 Pike Co.: Orton, 74  
 Pomeroy coal: Bownocker, 08a  
 Portage Co.: Newberry, 78a  
 Richland Co.: Read, 78  
 Ross Co.: Orton, 74  
 Sharon conglomerate: Lamb, 11  
 southeastern: Andrews, 71a, b, 73, 74  
 southern: Hyde, 11; Stout, 15  
 Stark Co.: Newberry, 78a  
 Steubenville quadrangle: Griswold, 07a  
 Summit Co.: Newberry, 73a  
 Toboso: Carney, 08c  
 Tuscarawas Co.: Newberry, 78a  
 Washington Co.: Andrews (E B), 64  
 Waverly group: Herrick, 89; Hicks, 78a; Hyde, 15a; Morse (W C), 12; Orton, 79a; Prosser, 04b  
 Waverlyan period: Bassler, 11d  
 Wayne Co.: Read, 78a  
 Western Reserve: Whittlesey, 53  
 Woodsfield quadrangle: Condit, 16b  
 Ohio Valley: Owen (D D), 46  
 Oklahoma: Aurin, 17; Beede, 09a; Blake (W P), 56a; Chance, 90b; Cullen, 17; Drake, 97; Gould, 01b, g, 02, 05; Perry, 17; Shannon, 15; Stevenson, 96; Wallis, 15  
 Arbuckle Mountains: Reeds, 10; Taff, 04; Vaughan, 09a  
 Atoka quadrangle: Taff, 02  
 Billings area: Fath, 16  
 Choctaw coal field: Chance, 90a; Taff, 00  
 Colgate quadrangle: Taff, 01  
 Cushing field: Buttram, 14a  
 east-central: Snider, 14  
 eastern: Gould, 10d  
 Foraker quadrangle: Heald, 16  
 Fort Scott-Boone interval: Berger, 18  
 Fort Smith-Poteau field: Smith (C D), 14  
 gas and oil fields: Adams (G I), 01a  
 Glenn field: Smith (C D), 14a  
 Grandfield district: Munn, 14  
 McAlester coal field: Girty, 99  
 McAlester quadrangle: Taff, 98  
 McCann sandstone: Gould, 00c  
 Marion and Wellington formations: Gould, 01f  
 Morrow group: Mather, 15  
 Muscogee quadrangle: Taff, 03  
 northeastern: Siebenthal, 08a; Ohern, 10; Snider, 12, 14a, 15

## Carboniferous—Continued.

Oklahoma: northwestern: Adams (G I), 98c  
 Osage Co.: Greene (F C), 18  
 Osage Reservation: Bowen (C F), 18b, c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18; Winchester, 18, 18a  
 Ouachita Mountains: Hill (R T), 91a  
 Pawhuska quadrangle: Heald, 18c  
 Pennsylvanian: Bloesch, 17  
 Permian: Beede, 09, 14  
 Ponca City field: Ohern, 12a  
 Pottsville formations: Mather, 17  
 red beds: Adams (G I), 01b; Beede, 12a; Ohern, 18; Snider, 13a  
 southern: Hutchison, 11; Powers, 17b; Wegemann, 15a, c, d  
 Tahlaquah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Wewoka formation: Girty, 11  
 Wichita Mountains: Taff, 04; Vaughan, 99a  
 Oregon, Baker district: Grant (U S), 14  
 eastern: Washburne, 03  
 Osage series cherts: Van Tuyl, 12b  
 Osage vs. Augusta: Weller, 98e  
 Ozark region: Adams (G I), 01; Keyes, 98m; Siebenthal, 15  
 Pacific slope: Smith (J P), 94  
 Paleogeographic map: Willis, 09  
 Pella limestone, Iowa: Weller, 15a  
 Pennsylvania: Althouse, 07a; Butts, 08a; Eaton (A), 33; Lesley, 58a, 92; Logan, 42; Lyell, 42a; Ramsay, 96; Rogers (H D), 58; Stevenson, 87c, 06; Wasmuth, 88a; Weaver, 37  
 Accident and Grantsville quadrangles: Martin (G C), 08a  
 Allegheny and Conemaugh series: Raymond (P E), 10c  
 Allegheny Co.: Stevenson, 77  
 Amity quadrangle: Clapp (F G), 07a, c  
 anthracite fields, sections: Griffith, 13  
 anthracite region: Ashburner, 86b; Stoek, 02  
 Armstrong Co.: Campbell (M R), 03f; Platt (W G), 80  
 Barnesboro and Patton quadrangles: Campbell (M R), 13a  
 Beaver Co.: White (I C), 74, 76, 78  
 Beaver quadrangle: Woolsey, 05, 06a  
 Bedford Co.: Stevenson, 85  
 bituminous coal field: White (D), 02  
 Blair and Huntingdon cos. section: Butts, 18  
 Blair Co.: Platt (F), 81a; White (D), 01a; White (I C), 89  
 Bradford Co.: Platt (F), 78  
 Broadtop field: Gardner (J H), 13a  
 Brownsville quadrangle: Campbell (M R), 03  
 Burgettstown quadrangle: Shaw (E W), 11d  
 Butler Co.: Chance, 79  
 Cambria Co.: Platt (F), 77  
 Cameron Co.: Sheaffer, 85  
 Carbon Co.: Ashburner, 84a  
 Carnegie quadrangle: Munn, 11a; Shaw (E W), 11d  
 Centre Co.: D'Invilliers, 84; Taylor (R C), 32  
 Clarion Co.: Chance, 80b  
 Clarion quadrangle: Lines, 07a; Munn, 10a; Shaw (E W), 11e



**Carboniferous—Continued.**

Pennsylvania: Claysville quadrangle: Munn, 12  
 Clearfield Co.: Chance, 84; Kemp, 93f; Platt (F), 75  
 Clinton Co.: Chance, 78, 78a, 80  
 Coal Measures: White (I C), 74a, 91; lower productive: Adams (T K), 03  
 Conemaugh sections: Raymond (P E), 09a  
 Connellsville quadrangle: Campbell (M R), 03  
 Crawford Co.: White (I C), 81  
 Ebensburg quadrangle: Butts, 05b  
 Elders Ridge quadrangle: Stone (R W), 05a, b  
 Elk Co.: Ashburner, 81, 85a  
 Elkland quadrangle: Fuller, 03a  
 Erie Co.: White (I C), 81  
 Fayette Co.: Stevenson, 77, 78a  
 Forest Co.: Ashburner, 85a  
 Foxburg quadrangle: Shaw (E W), 11b, e  
 Fulton Co.: Stevenson, 85  
 Gaines oil field: Fuller, 02a  
 Gaines quadrangle: Fuller, 03  
 Greene Co.: Boileau, 07; Stevenson, 76; Stone (R W), 07c  
 Hancock quadrangle: Stose, 12b  
 Huntingdon Co.: Ashburner, 75, 77, 78; Lesley, 76b; White (I C), 85  
 Indiana Co.: Hall (R D N), 11; Platt (W G), 78  
 Indiana quadrangle: Richardson (G B), 04a  
 Jefferson Co.: Platt (W G), 81  
 Johnstown area: Phalen, 07, 10, 11a  
 Kittanning quadrangle: Butts, 04, 06a  
 Latrobe quadrangle: Campbell (M R), 04  
 Lawrence Co.: White (I C), 79  
 Lehigh River section: Winslow, 87  
 Lycoming Co.: Meyer (A), 90; Sherwood, 80  
 McKean Co.: Ashburner, 80; Owen (D D), 57c  
 marine fossils, new horizons for: Raymond (P E), 09b  
 Meadville: Millward, 09  
 Masontown quadrangle: Campbell (M R), 02a  
 Mauch Chunk: Barrell, 07a, Stevenson, 02  
 Mercer Co.: White (I C), 80  
 millstone grit: Chance, 81a  
 Mississippian: Chance, 80a  
 Ohio and Beaver rivers region: Hice, 05  
 oil regions: Carll, 80  
 Panther Creek Valley: Richards (W B), 13  
 Patton quadrangle: Campbell (M R), 13a  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Pennsylvanian: Chance, 85b; White (I C), 85b  
 Perry Co.: Claypole, 85  
 Pittsburgh region: D'In villiers, 86, 87; Lesley, 76a, 86e  
 Potter Co.: Ashburner, 80a; Platt (F), 80; Sherwood, 80a  
 Pottsville-Allegheny boundary, interior province: White (D), 13c  
 Pottsville sedimentation, Appalachian region: White (D), 04  
 Rogersville quadrangle: Clapp (F G), 07b  
 Rural Valley quadrangle: Butts, 05a, 06a  
 Schuylkill Co.: Sheaffer, 54; New Boston Basin: Lyman, 89

**Carboniferous—Continued.**

Pennsylvania: Sewickley quadrangle: Munn, 10, 11  
 Somerset Co.: Lesley, 86a; Platt (F), 77a  
 southwestern: Ashley, 08b; Clapp (F G), 05  
 Sullivan Co.: Ashburner, 86d; Lyman, 67; Sherwood, 80  
 Susquehanna and Wayne cos.: White (I ) 81a  
 Susquehanna River region: White (I C), 83  
 Tioga Co.: Platt (F), 78  
 Tioga quadrangle: Fuller, 03a  
 Unconformity between Mississippian and Pennsylvanian: Butts, 08  
 Uniontown quadrangle: Campbell (M R), 02a  
 Warren Co.: Carll, 83  
 Warren district: Butts, 10; Randall, 75  
 Washington Co.: Boileau, 07; Stevenson, 76; Mississippian: Linn, 86  
 Waynesburg quadrangle: Stone (R W), 05  
 western: Carll, 90; Stevenson, 75a  
 Westmoreland Co.: Stevenson, 77, 78a  
 Wyoming Valley: Ashburner, 86c  
 Youghiogheny Valley: Platt (F), 76  
 Pennsylvania and Virginia, Lower Carboniferous: Rogers, (W B), 59d  
 Pennsylvanian-Permian contact: Kirk, 04; Lee (W T), 17b; Lesley, 80a  
 Permian: Case, 11a; Dutton, 80b; Herrick, 00b; Keyes, 99, 03, 06e, 10i; LaForge, 12; Marcou, 59; Newberry, 86c; White (C A), 80e  
 American: Keyes, 99  
 Blue Valley, Kans. and Nebr.: Beede, 00b  
 Kans.: Prosser 02a; Sternberg, 03c; Swallow, 58b, 59b  
 Nebr.: Geinitz, 67; Hicks, 86; Marcou, 64b, 67a  
 Prince Edward Island: Bain (F), 93  
 Tex.: Cummins, 90a; Shumard (B F), 58g; Tarr, 92c; White (C A), 89d, 91; northwestern: Marcou, 92a  
 Permian beds, so-called, age: Case 08a  
 Permian rocks of the Mississippi valley: Beede, 09c  
 Permo-Carboniferous red beds: Case, 15; correlation: Case, 18a  
 Potsdam fossiliferous pebbles in Carboniferous conglomerate: Rogers (W B), 61  
 Pottsville formation, Appalachian region: Grabau, 06b, d, 08a  
 Pottsville series: White (D), 96c  
 Kentucky: Campbell (M R), 00b  
 New River: White (D), 95  
 Prince Edward Island: Bain (F), 85, 93; Ells, 85, 03b; Dawson (J W), 71, 72b; Watson (L W), 12  
 Quebec, Gaspé Peninsula: Clarke (J M), 13d; Ells, 83a; Magdalen Islands: Clarke (J M), 11b  
 Red beds: Case, 17b  
 age and origin, southeastern Wyo.: Knight (S H), 17a  
 Kans.-Okla.: Beede, 01a; Gould, 01a, 13  
 Laramie Plains: Knight (W C), 02c  
 lithogenesis and stratigraphy, southeastern Wyo.: Knight (S H), 16  
 N. Mex., age: Lee (W T), 08c  
 origin: Knight (S H), 17



## Carboniferous—Continued.

Red beds: Stratigraphic position: Keyes, 08f  
 Tex., Okla., and Kans.: Adams (G I), 03a; Gould, 13  
 Rhode Island: Brown (C W), 10, 10a; Dale, 83; Emerson (B K), 07, 07a, 17; Hawkins, 18; Hitchcock (C H), 61c; Jackson, 40; Loughlin, 14b; Pirsson, 93a; Providence Franklin Soc, 87  
 Aquidneck Island: Hitchcock (C H), 61b  
 Conanicut Island: Collie, 95; Crosby, 97a  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 Narragansett Basin: Lahce, 12a; Shaler, 99  
 Rio Grande region: Keyes, 09m  
 Rocky Mountain region: Engelmann, 76; Hayden, 61  
 Ste. Genevieve, southeastern Iowa: Weller, 15a  
 St. Louis limestone: Engelmann, 47; brecciated character: Gordon, 90b  
 Sharon conglomerate, position: White (I C), 81b  
 South Dakota: Todd, 95, 98  
 Belle Fourche quadrangle: Darton, 09e  
 Black Hills: Carpenter (F R), 88; Crosby, 88a; Darton, 01a, 04c, 09, 09a, 18; Newton, 80; Winchell (N H), 75; northern: Jaggar, 04c  
 Edgemont quadrangle: Darton, 04a  
 Oelrichs quadrangle: Darton, 02a  
 Sunbury shale, Ohio: Prosser, 02  
 Tennessee: Christy, 48; Killebrew, 78; Safford, 56, 69  
 Briceville quadrangle: Keith, 96b  
 Chattanooga quadrangle: Hayes, 94b  
 Chattanooga series: Ulrich, 12  
 Cleveland quadrangle: Hayes, 95a  
 coal fields: Glenn (L C), 16; Nelson (W A), 16  
 Columbia quadrangle: Hayes, 03  
 Coosa Valley: McCalley, 97  
 eastern: Colton, 86  
 Greenville quadrangle: Keith, 05  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Little Sequatchie Valley: Killebrew, 76a  
 Loudon quadrangle: Keith, 96  
 McMinnville quadrangle: Hayes, 95c  
 Maynardville quadrangle: Keith, 01  
 middle: Safford, 51  
 Morristown quadrangle: Keith, 96a  
 Perry Co.: Wade (B), 14  
 Pikeville quadrangle: Hayes, 95b; Phalen, 11  
 Scott Co.: Glenn (L C), 15a  
 Sewanee quadrangle: Hayes, 94c  
 Standingstone quadrangle: Campbell (M R), 99  
 Tracy City: Brown (C S), 92  
 Wartburg quadrangle: Keith, 97  
 Waverlyan period: Bassler, 11d  
 Waynesboro quadrangle: Drake, 14; Miser, 17a  
 western: Dunbar, 17a  
 Texas: Blake (W P), 56, 56c; Buckley, 74; Cummins, 88a; Dumble, 90; Marcou, 55a, b, 61; Richard, 15; Shumard (G G), 86; Tarr, 92a; Udden, 14a, 16a  
 Apache Mountains: Osann, 96  
 Black and Grand prairies: Hill (R T), 01

## Carboniferous—Continued.

Texas: Central: Cummins, 90; Tarr, 90, 90b  
 Chisos country: Udden, 07a  
 Colorado coal field: Drake, 93, 17  
 Concho country: Cummins, 90b  
 El Paso quadrangle: Richardson (G B) 09  
 Glass Mountains: Udden, 17  
 Guadalupe Mountains: Girty, 08; Tarr, 92  
 Llano-Burnet region: Paige, 11  
 Llano Estacado: Cummins, 92a; northern: Baker (C L), 15  
 north central: Kempfer, 18  
 northern: Adams (G I), 02d; Cummins, 89; Gordon (C H), 11a; Shumard (B F), 60e  
 northwestern: Cummins, 91, 93; Marcou, 92a  
 Palo Pinto Co.: Wegemann, 15e  
 Panhandle: Gould, 06, 07  
 Permian: Case (E C), 07c, 09, 11a, 14; Cummins, 97; Girty, 02; Hill (R T), 89h; Leuchs, 08; Tarr, 92c; Wrather, 17  
 Presidio Co., Shafter district: Udden, 04  
 red beds: Case, 14  
 Runnels Co.: Beede, 18  
 Rustler Springs region: Porch, 17  
 trans-Pecos front range: Baker (C L), 17  
 trans-Pecos region: Richardson (G B), 04, 08; Streeruwitz, 90, 93  
 Van Horn quadrangle: Richardson (G B), 14  
 western: Jenney, 74; Richardson (G B), 10a  
 Wichita region: Gordon (C H), 13  
 Wichita-Brazos red beds: Gordon (C H), 09a  
 Wise Co.: Böse, 17  
 Theories, new, regarding the Carboniferous period: Bustamante, 09  
 Unconformity between Mississippian and Pennsylvanian: Butts, 08  
 Upper Carboniferous: Girty, 09  
 Utah: Engelmann (H), 58a; Meek, 60a  
 Bingham district: Keith, 05b  
 Canyon Range: Loughlin, 14  
 Castle Valley: Lupton, 16a  
 Cottonwood-American Fork region: Butler (B S), 15  
 eastern: Cross, 07  
 Green River desert: Emery, 18a  
 Iron Co.: Lee (W T), 07a  
 northeastern: Richards (R W), 12; White (C A), 89  
 northern: Gale, 10b  
 Ogden: Blackwelder, 10  
 Ontario mineral belt: Jenney, 06  
 Park City district: Boutwell, 07, 12  
 Promontory district: Butler (B S), 16  
 Randolph quadrangle: Richardson (G B), 13  
 San Francisco district: Butler (B S), 13  
 San Juan oil field: Woodruff, 12  
 southern: Leith, 08a  
 Tintic district: Smith (G O), 00; Tower, 99  
 Toquerville district: Huntington, 04  
 Uinta Mountains: Berkey, 05a; Emmons (S F), 07; Powell 76; Schultz, 18a; Weeks, 07  
 Wasatch Mountains: Blackwelder, 10a; Hintze, 13; Loughlin, 13  
 Virginia: Branson, 12; Fontaine, 77; Stevenson, 87c  
 Abingdon quadrangle: Stose, 14



## Carboniferous—Continued.

Virginia: Appalachian region: Darton, 92c  
 Big Stone Gap coal field: Campbell (M R), 93  
 Bristol quadrangle: Campbell (M R), 99a  
 Buchanan Co.: Hinds, 18  
 Bucu quadrangle: Hinds, 16  
 Clintwood quadrangle: Hinds, 16  
 Dante: Stone (R W), 07b  
 Estillville quadrangle: Campbell (M R), 94  
 Franklin quadrangle: Darton, 96c  
 Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Pound quadrangle: Butts, 14, 14a  
 Russell Fork coal field: Stone (R W), 07a  
 Scott and Wise cos.: Campbell (M R), 11d  
 southwestern: Lesley, 73; Stevenson, 81c, d, 85a, 87; Stose, 13; White (D), 05c  
 Staunton quadrangle: Darton, 94e  
 Tazewell Co.: Stevenson, 81f  
 Tazewell quadrangle: Campbell (M R), 97  
 Wapanucka limestone, Okla.: Wallis, 15  
 Washington, Blewett district: Weaver, 11  
 Colville Indian Reservation: Pardee, 18a  
 Covada district: Weaver, 13  
 Myers Creek mining district: Umpleby, 11  
 Oroville-Nighthawk mining district: Umpleby, 11a  
 Waverly fossils, Ohio: Herrick, 91  
 Waverly group: Cooper (W F), 90; Herrick, 89, 93; central Ohio: Hicks, 78a; northeastern Ohio: Girty, 01  
 Waverly series, Ohio: Prosser, 01, 04b  
 West Virginia: Campbell (M R), 96; Fontaine, 77; Grimsley, 06; Ramsay, 96; Reger, 16; Rogers (W B), 41; Stevenson, 75b, 87c, 06; White (I C), 82a, 83c, 03, 08  
 Accident and Grantsville quadrangles: Martin (G C) 08a  
 Barbour Co.: Reger, 18  
 Boone Co.: Krebs, 15  
 Braxton and Clay cos.: Hennen, 17; Price (W A), 17  
 Buckhannon quadrangle: Taff, 96  
 Cabell, Wayne, and Lincoln cos.: Krebs, 13  
 Charleston quadrangle: Campbell (M R), 01  
 Charleston sandstone: Campbell (M R), 03b  
 Cheat River region: White (I C), 82b  
 Coal Measures: Stevenson, 73; White (I C) 74a, 91  
 Doddridge and Harrison cos.: Hennen, 12  
 Franklin quadrangle: Darton, 96c  
 Grantsville quadrangle: Martin (G C), 08a  
 Great Kanawha Valley: White (I C), 85a  
 Greene Co.: Page, 89  
 Huntington quadrangle: Campbell (M R), 00a  
 Jackson, Mason, and Putnam area: Krebs, 11  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Kanawha Co.: Krebs, 14  
 Kanawha Valley: Stevenson, 73a  
 Kenova quadrangle: Phalen, 08a, 12  
 Lewis and Gilmer cos.: Reger, 16  
 Logan Co.: Hennen, 14a  
 McDowell Co.: Hennen, 15  
 Mannington field: White (I C), 92

## Carboniferous—Continued.

West Virginia: Marion Co.: Hennen, 13; Stevenson, 73b  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Mercer Co.: Stevenson, 81f  
 Mingo Co.: Hennen, 14a  
 Monongalia Co.: Brown (S B), 92; Hennen, 13; Stevenson, 71, 73b  
 Monterey quadrangle: Darton, 99  
 New River: Fontaine, 74; White (D), 95  
 Panhandle: Grimsley, 07  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Permian flora: Fontaine, 80  
 Peytonia, Boone Co.: Lyman, 95a  
 Piedmont quadrangle: Darton, 96b  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Potomac River region: White (I C), 81c  
 Preston Co.: Brown (S B), 92; Hennen, 14; Stevenson, 81e  
 Raleigh Co.: Althouse, 06; Krebs, 16  
 Raleigh quadrangle: Campbell (M R), 02  
 Steubenville quadrangle: Griswold, 07a  
 Summers Co.: Krebs, 16  
 Taylor Co.: Hennen, 13  
 Tazewell quadrangle: Campbell (M R), 97  
 Tyler Co.: Hennen, 09  
 Uffington shale: Price (W A), 17 a, b  
 Upshur Co.: Reger, 18  
 Wetzel Co.: Hennen, 09  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Wyoming Co.: Althouse, 06; Hennen, 15  
 Western interior coal field: Keyes, 98k, 00g, 01h, k, l  
 Western States, fortieth parallel: King (C), 76a  
 Wyoming: Darton, 08  
 Absaroka quadrangle: Hague, 99b  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Big Horn Basin: Fisher (C A), 06; Hewett, 17  
 Big Horn Mountains: Darton, 04c, 06e  
 Black Hills region: Darton, 09  
 central: Hares, 16  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Douglas oil field, Converse Co.: Barnett, 14; Jamison, 12  
 Embar and Chugwater formations: Condit, 16  
 Embar formation: Branson, 16  
 Fremont Co.: Jamison, 11a  
 Green River district: Peale, 79  
 Hartville quadrangle: Smith (W S T), 03  
 Lander oil field: Woodruff, 11  
 Laramie and Sherman quadrangles: Darton, 10c  
 Laramie Basin: Darton, 09f  
 Laramie Mountains: Darton, 16a  
 Lincoln Co.: Schultz, 14  
 Newcastle quadrangle: Darton, 04  
 North Laramie Mountains: Spencer (A C), 16a  
 northwest: Eldridge, 94a  
 Owl Creek Mountains: Darton, 06  
 red beds: Knight (S H), 16



## Carboniferous—Continued.

- Wyoming: Salt River Range: Mansfield, 16a  
 Sundance quadrangle: Darton, 05a  
 western: Blackwelder, 11, 18b; Comstock, 74; Condit, 18; Gale, 10b; Schultz, 18  
 Wind River Range: Endlich, 79  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yellowstone National Park: Hague, 99; Weed, 96  
 Yukon: Cairnes, 08a  
 international boundary: Cairnes, 14  
 Lewes and Nordenskiöld rivers district: Cairnes, 10  
 Porcupine to Arctic boundary: Maddren, 12a  
 White River district: Cairnes, 14d, 15  
 Carcharodon: Dean, 09a  
 Caribbean Islands, petrographic history: Frazer, 03a  
 Carinifex, Santa Clara lake beds: Hannibal, 09  
 Carlinville oil and gas field, Ill.: Kay (F H), 12  
 Carlyle oil field, Ill.: Shaw (E W), 12  
 Carmen Islands, Lower California: Cook (E H), 08  
 Carnegie quadrangle, Pa.: Shaw (E W), 11  
 Carnotite. *See also* Radium  
 Colorado: Curran, 13; Fleck, 07; Moore (R B), 13  
 Rio Blanco Co.: Gale, 07  
 Routt Co.: Gale, 08a  
 General: Kennan, 15  
 Origin: Hess, 14a  
 Pennsylvania, Mauch Chunk: Wherry, 14  
 Utah: Curran, 13; Howard, 14; Moore (R B), 13  
 Green River: Hess, 13a  
 Carpenter, F. R., biography: Hofman, 10, 11  
 Carriacou: Harrison (J B), 96  
 Carrizo sands: Dumble, 11a  
 Carthage coal field, N. Mex.: Gardner, 10a  
 Cartography.  
 Baltimore region, mapping: Williams (G H), 87f  
 Coloring geologic maps: Branner, 86c; Powell, 91e, 93c  
 Colors and patterns for geologic maps: Powell, 82  
 Contour lines on geologic maps: Lyman, 85  
 Contouring topographic forms: Johnson (D W), 08a  
 Conventional signs for mineral occurrence maps: Ingall, 08  
 Crystalline schists: Hobbs, 02a  
 Earthquakes, map for locating: Joerg, 13  
 Formations, cartographic representation: Keyes, 02a  
 General: Curtis, 11b; Frazer, 86b; Powell, 91e; Winslow, 92a  
 Geologic map, preparation: Eckel, 02b  
 Geologic map of United States (explanation): Powell, 93b  
 Geologic maps, construction: Jackson, 41c  
 Geologic mapping: Barnett, 13; Cope, 87i; Eckel, 01c, 02b; Lahee, 16; Paige, 14; Powell, 82a, 88c, 90; Smith (F C), 13; Stebinger, 13  
 Landforms, mapping: Matthes, 08  
 Magnetic observations in geologic mapping: Smyth (H L), 97a

## Cartography—Continued.

- Mine maps and sections: Brunton, 05  
 New York, geologic maps: Leighton, 09  
 Nomenclature, coloring, notation: Selwyn, 83a  
 Oil maps, marking of: Johnson (R H), 10a  
 Plane-table mapping: Higgins, 13; Pelton, 12; Ransome, 12a; Wegemann, 12b  
 Recording field work: Clapp (C H), 13; Kemp, 13  
 Relief maps: Curtis, 03c, 11a  
 Representation of culture features on geologic maps: Lane, 08h  
 Strata maps: Ives, 88a  
 Texas, geological mapping: Udden, 16  
 United States, geologic map: Blake (W P), 80; Raymond, 73a  
 Casadepaga quadrangle, Alaska: Smith (P S), 10  
 Cascade basin, coals: Dowling, 07, 09a  
 Cascade Mountains: Russell, 00; Smith (G O), 04b; structure and age: Diller, 96b; LeConte, 73a  
 Casselton-Fargo folio, N. Dak.-Minn. (no. 117): Hall (C M), 05  
 Cassiar coal fields, B. C.: Bell (J J), 07  
 Castile gypsum and Rustler formation, age: Udden, 15b  
 Castillo, Antonio del, biography: Aguilera, 97a; Galindo, 98; Ordóñez, 96  
 Castle Dome lead district, Ariz.: Nevius, 12  
 Castle Rock folio, Colo. (no 198): Richardson (G B), 15  
 Castle Valley, Utah: Lupton, 16a  
 Castoroides. *See* Mammalia.  
 Caswell, J. H., biography: Kemp, 10d  
 Catahoula sandstone: Matson, 16a; Texas, origin: Goldman, 15  
 Cataract formation: Schuchert, 14a  
 Catastrophism and evolution: King (C), 77a  
 Catatonk quadrangle, drumlinoids: Hubbard, 06  
 Catenipora: Hall, 43c  
 Catskill. *See* Devonian.  
 Catskill delta in postglacial Hudson estuary: Davis (W M), 92  
 Catskill Mountains: Guyot, 80; Hall, 76c; Heilprin, 07; glaciation: Rich, 06; origin: Clarke (J M), 15c  
 Catskill region: Hall, 78b  
 Catskill Valley glacial lakes: Chadwick, 10a  
 Cave faunas.  
 Arkansas, northern: Brown (B), 08  
 California: Merriam, 06d.  
 Caves.  
 American: Hovey (H C), 96  
 Arizona, Bisbee, Copper Queen cave: Beasley, 16; Hovey (E O), 11b; Wilson (P D), 14  
 Canada: Gibb, 60  
 Colossal Cavern, Ky.: Hovey (H C), 96, 04, 12; Le Couppey de la Forest, 03  
 Crystal Cave, S. Dak.: Hovey, 04k  
 Deutschman, B. C.: Ayres, 07, 07a,b  
 Ely cave, Lee Co., Va.: Shaler, 85a  
 Exploration, scientific: Martel, 05  
 General: Hovey (H C), 96; Shaler, 87c  
 Glaciers or freezing caverns: Balch, 00  
 Hydration caves: Kraus, 05b  
 Ice caves: Miller (A M), 13



## Caves—Continued.

- Indiana: Blatchley, 97b; Elrod, 99; Farrington, 01e; Grecne, (F C), 09  
 Bloomington quadrangle: Beede, 11a  
 Hanover cave: Hovey (H C), 78  
 Putnam Co., University Cave: Reasoner, 84  
 Versailles: Bigney, 16a  
 Influence on topography: Russell, 05c  
 Iowa, Winneshiek Co.: Calvin, 06  
 La Jolla sea caves: Winsted, 13  
 Luray Cave, Va.: Ammen, 82; Ashburner, 84c; Lusk, 86; Anon, 81  
 Mammoth Cave, Ky.: Forwood, 70; Gardner (J H), 10f, 11; Hovey (H C), 78, 90, 91, 96, 97, 97a, 08, 09, 12; Le Couppey de la Forest, 03; Martel, 14; Nelson (N C), 17; Silliman (jr), 51; Stevens (W L), 82; Turner (J W), 12; Whitbeck, 13a  
 bibliography: Hovey (H C), 12a, 14  
 crystal growths: Call, 00  
 map: Call, 97  
 Manitou, Colo.: Le Couppey de la Forest, 03  
 Marble Cave, Mo.: Emery, 85  
 Mexico, Atoyac: Allorge, 08; Villada, 10c  
 Cacahuamilpa, Guerrero: Flores, 10; Urbina, 09a; Villada, 88a  
 Ojo de Agua: Villada, 88  
 Pedregal San Angelo, caves in lava: Wittich, 16d  
 Puebla, Tzinacamostoc: Haarman, 11  
 Missouri: Broadhead, 74; Newburg district: Lee (W), 11  
 Mitchell's Cave, N. Y.: Eights, 48  
 Monteagle Cave, Tenn.: Nelson (W A), 12b  
 Nakimu, B. C.: Wheeler (A O), 07  
 New Brunswick: Bailey, 04  
 New York: Clarke (J M), 07d  
 Schoharie Valley: Grabau, 06  
 Valcour Island: Hudson, 10  
 Nova Scotia, Hants Co.: Prest, 12  
 Occurrence and origin: Barek, 13  
 Ohio Valley: Shaler, 76  
 Oliver's Cave, N. B.: Matthew (G F), 04  
 Ontario, Rockwood: Pantou, 89; Wakefield: Dawson (J W), 69a  
 Origin, Put-in-bay: Kraus, 05a  
 Ozarks and Black Hills: Owen (L A), 98  
 Pennsylvania, Huntingdon Co.: Morganroth, 01  
 Potter Creek Cave, Shasta Co., Cal.: Sinclair, 03b  
 Reames Cave, Ohio: Hills (T N), 16  
 Stalactites and gypsum incrustations: Merrill (G P), 94  
 Subterranean map making: Hovey (H C), 83  
 Tennessee: Bailey (T L), 18  
 United States: Le Couppey de la Forest, 03  
 Virginia: Harlan, 31b  
 Wind Cave, S. Dak.: Hovey, 00e  
 Wyandotte Cave, Ind.: Collett, 79; Le Couppey de la Forest, 03  
 Cave marble, Tennessee: Gordon (C H), 12  
 Cebol district, Gunnison Co., Colo.: Singewald, 12b  
 Celestite.  
 Arizona: Phalen, 14  
 California: Phalen, 14; San Bernardino Co., Lavic station: Mallery, 16  
 Texas: Hess, 09b

## Celestite-bearing rocks: Kraus, 05

## Cement and cement materials.

## Classification: Eckel, 02a

General: Bowles, 18; Cummings, 95; Eckel, 04e, 05, 05e; Newberry (S B), 93

Southern States: Maynard, 11; Watson, 14d

United States: Burchard, 11a; Eckel, 05a, 13; U S G S, 83

Cenozoic, interior: Cope, 88a; marine: Smith (E A), 88a

Cenozoic mammal horizons of western North America: Osborn, 09

Central America. *See also* Costa Rica; Guatemala; *etc*

Cenozoic history: Vaughan, 18c

General: Sapper, 05c; Seebach, 65

Geology: Merz, 07

Mesozoic history: Stanton, 18

Panama straits, ancient: Dickerson, 17c

*Economic geology.*

Iron ore reserves: Kemp, 10a

*Historical geology.*

General: Dickerson, 17c

Northern: Sapper, 99

Tertiary, correlation: Vaughan, 18d

*Petrology.*

Lavas: Marx, 68

*Physical geology.*

Earthquakes: Montessus de Ballore, 84, 88, 98; Perrey, 47

Masaya earthquake: Sapper, 06

Tides and volcanic activity: Krebs, 03

Volcanic eruptions: Montessus de Ballore, 84 88; Sapper, 04c

Volcanoes: Sapper, 01, 05, 11, 13; Seebach, 92; distribution: Sapper, 97a

Volcanoes and earthquakes: Bertrand, 99

*Physiographic geology.*

General: Durocher, 60, 60a; Virlet d'Aoust, 66

Geologic waterways: Spencer (J W), 98g

Mountain systems: Sapper, 05c

Northern: Sapper, 99

Physiographic notes: Wegener, 04

Seismic disturbances, recent, effects: Jones (J O), 03

Centrosaurus: Lambe, 10b

Century of geology: Le Conte, 00

Cephalopoda. *See also* Mollusca.

Acceleration of development: Smith (J P), 14a

Actinoceras: Foord, 88

Actinosepia, Cretaceous, South Saskatchewan River: Whiteaves, 98b

Agassicerias: Hyatt, 75

Ammonites: Hyatt, 75a

Cretaceous, Peace River: Whiteaves, 85b, 93

Queen Charlotte Islands: Whiteaves, 93b

Texas: Lasswitz, 04

Delaware: DeKay, 27

Jurassic, Cuba: Torre, 10, 10b

Mexico: Pohlig, 85

Mesabi range, Minn.: Wolff (J F), 16

reversions: Hyatt, 71, 74b

Shasta Co., Cal.: Trask, 55b

Tejon: Heilprin, 82a, d; Newberry, 82d

Texas: Gabb, 60d

Ammonites James-Danae: Bárcena, 79b



## Cephalopoda—Continued.

- Angulitidae**, genetic relations: Hyatt 74a,  
**Aptychus** in Ammonites: Eastman, 96b  
**Arietidae**, evolution: Hyatt, 74; genesis:  
     Hyatt, 89  
**Bactrites**, early stages: Clarke (J M), 94f  
**Baculites**, revision: Gabb, 61g  
**Baculites compressus**: Brown (A P), 92; young:  
     Brown (A P), 91  
**Barrandeoceras**: Whiteaves, 06a  
**Beatricea**: Hyatt, 65  
**Beekmantown** and Chazy formations: Ruede-  
     mann, 06  
**Belemnitella americana** and mucronata,  
     habitat: Dorsey, 17  
**Biogenetic law**: Smith (J. P.), 13  
**British Columbia**, Cretaceous: Whiteaves, 95d  
**Buchiceras**, Cretaceous: Cragin, 00a  
**California**, Cretaceous: Anderson (F M), 02;  
     Tertiary: Trask, 56b  
**Canada**: Barrande, 57; Billings, 57d; Whit-  
     eaves, 98d  
**Caney shale fauna**, Okla.: Girty, 09b  
**Carboniferous**: Hyatt, 91; Miller (S A), 92a;  
     Smith (J P), 03  
**Cardioceras**, Alberta: Whiteaves, 03d  
**Ceratites**, Alabama: Harper, 56  
**Cincinnati**: James (J F), 86; Miller (S A), 75a,  
     82b, 84  
**Classification**: Bather, 92; Chapman (E J), 57a;  
     Hyatt, 98  
**Clymenia**, Naples beds: Clarke (J M), 92d  
**Cryptoceras**, Lorette, Quebec: Chapman (E J),  
     57a  
**Cuba**, Jurassic: Torre, 10, 10b  
**Cyrtoceras cuneatum**: Whiteaves, 06e  
**Dactylidae**: Hyatt, 72b  
**Development**: Hyatt, 94  
**Devonian**: Clarke (J M), 07a; restored: Cle-  
     land, 07  
     catalog: Frech, 13  
**Embryology**: Hyatt, 72  
**Endoceras**, structure: Whitfield, 81b  
**Endocerata**, siphon: Hyatt, 85b  
**Endoceratidae**, siphuncle: Whiteaves, 05  
**Evolution**: Hyatt, 84  
**Genera**: Hyatt, 83  
**General**: Clarke (J M), 93a; Hyatt, 67, 84c; 93b  
**Glyphioceras**, development: Smith (J P), 97a  
**Gomphoceras**, Trenton, Wis.: James (J F), 86a  
**Goniatite**, eastern Kans.: Meek, 76a  
**Goniatite fauna**: Hall, 60c  
**Goniatites**, Carboniferous, Tex.: Gabb, 61f;  
     early stages: Clarke (J M), 99a  
**Goniatitidae**: Hall, 75  
**Greenland**, Kuhn Island: Toula, 74a  
**Growth and decline stages**: Hyatt, 88  
**Helioceras**, Cretaceous, Nebr.: Whitfield, 01  
**Heteroceras**, Cretaceous, S. Dak.: Whitfield,  
     02a  
**Iowa**, Coal Measures: Keyes, 96p; Niagaran:  
     Thomas (A O), 15a  
**Jurassic**, Alaska: Pompeckj, 00  
     Mexico: Castillo, 95, 12; Mazapil: Burekhardt,  
     06c  
**Kansas**, Permo-Carboniferous: Hay (R), 93c  
**Liparoceratidae**: Hyatt, 72b, 74c

## Cephalopoda—Continued.

- Lituites**, Silurian, Ind.: Whitfield, 85b  
**Lytoceras**, Cretaceous, Denman Island, B. C.:  
     Whiteaves, 01a  
     development: Smith (J P), 98a  
**Manitoba**, Cambro-Silurian: Whiteaves, 90;  
     Winnipeg basin, Orthoceratidae: Whit-  
     eaves, 92a  
**Maryland**, Devonian: Clarke (J M), 13e; Ohern,  
     13b; Prosser, 13c  
**Mexico**, Cerro de Muleros: Böse, 10; Cretaceous:  
     Burekhardt, 12  
**Michigan**, Marshall group: Winchell (A), 62  
**Montana**, Cretaceous: Meek, 56a  
**Moorefield shale fauna**: Girty, 11  
**Nanno**: Clarke (J M), 94g; Hyatt, 95; Sardeson,  
     94; Whiteaves, 05  
**Naples fauna**: Clarke (J M), 99  
**Nautilus alabamensis**: Geinitz, 87  
**Nautilus brookfieldi**, Lower Carboniferous,  
     Colchester Co., N. S.: Honeyman, 88a  
**Newfoundland**: Hyatt, 85  
**New Jersey**, Cretaceous and Tertiary: Whit-  
     field 92; Mullica Hill: Browne (P A), 49  
**Niagaran**, Iowa: Thomas (A O), 15a; northern  
     Indiana: Newell, 88  
**Ontario**, Lake Huron region: Stokes, 40  
**Ordovician**, Minnesota: Clarke (J M), 97c  
**Orthoceras**, Carboniferous, Iowa: Keyes, 96l  
     Galena, Ill.: Verneuil, 47  
     Oneonta beds, N. Y.: Clarke (J M), 00a  
     protoconch: Clarke, 93b  
     specific characters: Foerste, 93d  
     soft parts, Cincinnati: Anthony, 47; Hall, 49a  
**Orthoceras hageri**, Vermont: Hall, 61g  
**Orthocerata**, Canada: Stokes, 38  
     structure: Hall, 44b; Whitfield, 81b  
     Tennessee: Troost, 38  
**Orthoceratidae**, Manitoba: Whiteaves, 92a  
**Oxynoticeras**: Hyatt, 75  
**Park City formation**, phosphate beds fauna:  
     Girty, 10  
**Peltoceras**, Jurassic, Alberta: Whiteaves, 07a  
**Permo-Carboniferous ammonoids**, Glass Moun-  
     tains, Tex.: Böse, 17a  
**Phylloceras**, development: Smith (J P), 98a  
**Piloceras**: Dawson (J W), 81f; Foord, 87  
**Placentoceras**, development: Smith (J P), 00b  
**Plectoceras**: Whiteaves, 03, 03f, 06a  
**Plectoceras jason**, New York: Ruedemann, 12  
**Primitive forms**: Hyatt, 87; structure: Ruede-  
     mann, 05  
**Prodromites**: Smith (J P), 01  
**Protoconchs**: Clarke (J M), 95b; Hyatt, 84b  
**Pseudoceratites**, Cretaceous: Hyatt, 03  
**Pseudorthoceras knoxense**, apical end: Girty, 16  
**Salem limestone**, Ind.: Cumings, 06a  
**Scaphites**: Smith (W D), 05  
**Septa**, development: Hall, 56a  
**Shell**, embryology and development: Hyatt,  
     72a  
**Silurian**, Ohio: Foerste, 93c  
**South Dakota**, Cretaceous: Buch, 53; Meek,  
     56a  
**Stephanoceras**, genetic relations: Hyatt, 76a  
**Stepheoceras** from the British Columbia Juras-  
     sic: Whiteaves, 09



**Cephalopoda—Continued.**

- Structure of shell: Hyatt, 65b  
 Sutton Jurassic of Vancouver Island, B. C.: Clapp (C H), 11a  
 Tetrabranchiata, growth stages: Hyatt, 66  
 Texas, Carboniferous: Hyatt, 93; ammonite: Heilprin, 84c  
 Cretaceous: Schlüter, 87a  
 Eocene: Gabb, 60e  
 Tornoceras: Beecher, 90  
 Triassic: Hyatt, 05; Smith (J P), 04a  
   marine: Smith (J P), 14  
   Mexico, Zacatecas: Burckhardt, 05  
 Trochoceras grovaniense: Mook (R R), 15  
 Trocholites, Canada: Whiteaves, 04a
- Ceratops: Marsh, 88b  
 Ceratops beds, Wyoming: Hatcher, 93; Stanton, 09a
- Ceratopsia: Hatcher, 05, 07; Lull, 07  
   cranial musculature and frill: Lull, 08a  
   evolution: Lull, 12
- Ceratosaurus: Marsh, 84d
- Cerbat Range, Ariz.: Schrader, 08a, 09
- Cercopidae: Cockerell, 08b
- Cerrillos coal field, N. Mex.: Lee (W T), 13a
- Cerrillos Hills, N. Mex.: Johnson (D W), 03
- Cetacea. *See* Mammalia.
- Chalcocite, etch patterns: Tolman, 16a; occurrence: Graton, 15; synthesis and genesis: Winchell (H V), 03
- Chalcocite enrichment: Spencer (A C), 13a
- Chalicotheroidea, osteology: Holland, 13
- Chalk, Kansas: Patrick, 75; Niobrara: Calvin, 94b
- Chalk Bluffs, Colo.: Henderson, 07
- Chalmersite, Prince William Sound, Alaska: Johnson (B L), 17b
- Champlain submergence: Upham, 92d
- Champlain Valley, Pleistocene history: Baldwin, 94
- Champsosaurus: Brown (B), 05
- Changes of level. *See also* Beaches: Shore lines; Terraces.
- Alaska: Meehan, 83; Tarr (R S), 05f; Yakutat Bay region: Tarr (R S), 06c, d, 12b
- Algonquin and Iroquois beaches: Goldthwait, 10a; Taylor (F B), 10d
- Antigua: Spencer (J W), 01
- Antillean region: Spencer (J W), 95b, 98d, 01h, c
- Arctic regions: Howorth, 73
- Atlantic and Pacific coasts, Tertiary and post-Tertiary changes: Le Conte, 91
- Atlantic coast: Casey, 11; Curtis, 11a; Gesner, 61a  
 Johnson (D W), 12; Mitchell, 80; Shaler, 94a; stability: Johnson (D W), 17a
- Baffin Land: Watson, 97
- Bermuda Islands: Jones (J M), 72; Tarr, 97h; Verrill, 00, 07
- British Columbia, coast: Dawson (G M), 77c
- California: Comstock, 02a; Davidson (G), 97; Wittich (E), 12  
   northern coast: Lawson, 94  
   Pliocene and Pleistocene: Fairbanks, 97  
   San Francisco: Blake (J), 63  
   Santa Clara Valley: Branner, 07  
   southern: Ritter, 01  
   southern coast: Lawson, 93e

**Changes of level—Continued.**

- Cause: Baker (H B), 12; Dutton, 71, 89a; Fisher (O), 06; Hixon, 11; Lockington, 85; Spencer (J W), 13b
- Central America: Powers, 18
- Chamreyparis bog, Woods Hole, Mass: Johnson (D W), 13
- Change in ocean volume: Humphreys, 15
- Coastal dunes as evidence of rise of sea level: Sanford, 16
- Coastal subsidence: Davis (C A), 14; Johnson (D W), 13a, 14a; botanical evidence: Bartlett, 11
- Connecticut Valley: Fairchild, 14a
- Continental: Shaler, 75a
- Continental elevation preceding Pleistocene period: Spencer (J W), 90
- Continental movements, Quaternary: McGee, 91g
- Costa Rica, Talamanca region: MacDonald (D F), 14; Miller (B L), 14; Earth movements in the Laurentian basin: Hobbs, 08a, 09a
- Eastern America: Scrope, 28
- Eastern coast: Cook, 83a
- Elevation and subsidence: Le Conte (Jos), 84a
- Epeirogenic movements, glacial period: Upham, 93a
- Florida: Lewis (E), 66; Vaughan, 14c, 16  
   eastern: Sellards, 10b  
   Gulf coast: Vaughan, 02i  
   southern: Sanford, 09  
   west coast: Gorrie, 54
- General: Belt, 63; Blytt, 90; Carter, 09; Hull, 12; Johnson (D W), 14c; Lane, 03e; Nansen, 04; Pearson, 01, 04; Richardson (J), 86; Shaler, 66, 68, 71; Spencer (J W), 93a; Tylor, 54; Vaughan, 15c; Williams (E H), 90
- Glacial depression and postglacial uplift of northeastern America: Fairchild, 18a
- Great Lakes region: Chalmers, 02a; Fuller, 04f; Gilbert, 88a, 97a, c, 98; Spencer (J W), 07, 13d; Taylor (F B), 95c, 98, 08; terrestrial stability: Spencer (J W), 16a
- Greenland, west coast: Pingel, 35, 41
- Green Mountains: Scott (W K), 64
- Guadeloupe: Spencer (J W), 01a
- Hudson Bay region: Bell (R), 96a, 97a; Ochsnius, 99; Tyrrell, 96c
- Hudson-Champlain valley: Fairchild, 14a
- Indiana: Campbell (J T), 01
- Isobases of post-Algonquin elevation: Goldthwait, 09a
- Isostasy, geodetic evidence for: Hayford, 06
- Isostatic subsidence of volcanic islands: Davis (W M), 17b
- Jamaica: Spencer (J W), 98c
- Labrador: Fuller, 07a
- Lake Erie, subsidence at west end: Moseley, 05a
- Lake Ontario basin, postglacial: Gilbert, 85c
- Laurentian lakes basin, recent earth movements: Hobbs, 09a
- Local subsidences: Freeman (H C), 87a
- Louisiana: Hilgard, 69b
- Maine, coast: Dana, 75c; Davis (C A), 15, 16a; Shaler, 74a



## Changes of level—Continued.

- Massachusetts: Davis (C A), 12; Hubbard (E), 11; Johnson (D W), 10b, 11a, c, 12, 13, 13a; Townsend, 11  
 Boston, postglacial: Shimer, 18  
 Boston and vicinity: Freeman, 03  
 Cape Ann: Shaler, 89b; Tarr, 03  
 Cape Cod, coastal marshes: Davis (C A), 12  
 eastern: Johnson (D W), 10d  
 Essex Co.: Sears, 94, 08  
 Marblehead: Hyatt, 70  
 Mexico: Hull, 98; Spencer (J W), 97  
 Lower California: Davidson (G), 97; Wittich (E), 12  
 Michigan: Hobbs, 11c  
 Mississippi Valley, Pleistocene crustal movements: Todd, 13  
 Mobility of ocean bed: Daly, 11  
 Montana, earth movement at Butte: Chapman (R H), 08, 08a  
 Movement in crust of earth: Powell, 98  
 Neocene and Pleistocene: McGee, 91g  
 New Brunswick: Goldthwait, 14a; postglacial: Goldthwait, 12  
 New England: Spencer (J W), 95e, 98i  
 New England coast: Davis (C A), 10c; differential movement: Curtis, 04  
 Newfoundland: Perley, 50  
 New Jersey: Cook, 57b  
 New York, Long Island: Cook, 57b; Fairchild, 17a; Lewis (E), 68, 77b  
 New York City region: Tuttle, 04  
 postglacial: Spencer (J W), 13  
 New York and New Jersey: Merrill (F J H), 90a  
 North America: Shimer, 07b  
 Nova Scotia, Atlantic coast, subsidence: Poole, 06b  
 Louisbourg, subsidence: McIntosh, 06  
 southern coast, subsidence: Prest, 92  
 Ontario: Mills (S D), 04  
 Ottawa Valley: Ells, 94b  
 postglacial: Spencer (J W), 13, 14a  
 Temagami-Temiskaming district: Pirsson, 10a  
 Oscillations of level of Pacific coast: Blake (W P), 98a  
 Pacific Ocean: Dana, 53a  
 Pleistocene: Adams (C B), 51; Geer, 92a; Hitchcock (C H), 71a; Perry, 71c; Upham, 78a, 05a; Whittlesey, 68; and Recent: Barrell, 15; Vaughan, 15c  
 Pleistocene crustal movements in Mississippi Valley: Todd, 13  
 Pleistocene glaciation and coral reef problem: Daly, 10b  
 Porto Rico: Mitchell (G J), 18  
 Postglacial uplift of northeastern America: Fairchild, 18, 18a, b; Spencer (J W), 91b  
 Preglacial elevation: Upham, 90a  
 Quaternary: Dana, 72d; Jukes-Browne, 90, 91; Upham, 90f, 91i, j  
 Quebec: Goldthwait, 11a, 13b; postglacial: Spencer (J W), 13; Goldthwait, 12  
 Rhode Island, Narragansett Bay region: Fuller, 98a  
 Saginaw basin: Leverett, 18b  
 St. Lawrence River basin, Quaternary: Upham, 95

## Changes of level—Continued.

- Sea level, change of: Shaler, 95c  
 South Carolina: Lieber, 59b  
 Strand-line movements, factors in: Barrell, 15; Vaughan, 15c  
 Submerged valleys, Sandusky Bay: Moseley, 02  
 Subsidence, supposed, of Massachusetts and New Jersey coasts: Johnson (D W), 10b  
 Subsidence of reef-encircled islands: Davis (W M), 18a  
 Tangential movements, Great Lakes region: Decker, 16  
 Tertiary elevation of America: Dall, 91a  
 Vermont, postglacial: Fairchild, 16  
 Warping, Great Lakes region: Spencer (J W), 87, 91d  
 Water planes, ancient, and crustal deformation: Robinson (H H), 08  
 West Indies: Simpson (C T), 94; Spencer (J W), 93a, 98f  
 Windward Islands: Spencer (J W), 02b  
 Channahon limestone, Ill.: Savage, 12  
 Channel fillings in Devonian shales: Williams (H S), 81b  
 Chapin, J. H., biography: Davis (W M), 93b  
 Chapman sandstone and its fauna, Maine: Williams (H S), 16  
 Charles River estuary: Crosby, 03  
 Charleston earthquake. *See* South Carolina.  
 Charleston folio, W. Va. (no. 72): Campbell (M R), 01  
 Charts.  
 Geological chart of the world: Mathews, 74  
 Section of successive formations: Hall, 52a  
 Chatham series, N. C.: Emmons (E), 59  
 Chattahoochee embayment: Johnson (L C), 92  
 Chattanooga black shale: Grabau, 07f  
 Chattanooga district: Higgins (E), 09; physiography: Hayes, 99e  
 Chattanooga folio, Tenn. (no. 6): Hayes, 94b  
 Chattanooga series: Ulrich, 12; Kinderhook age: Ulrich, 15  
 Chazy fauna: Raymond (P E), 06, 11; Seely, 06a; Gastropoda: Raymond (P E), 08; Pelmatozoa: Hudson, 07  
 Chazy formation, Champlain Valley: Brainerd, 91; Raymond (P E), 06; Seely, 06a  
 Chehalis sandstone: Lawson, 94b  
 Chelonia. *See* Reptilia.  
 Chemical analysis of rocks: Washington, 04  
 Chemical deposits of the sea: Vaughan, 17b  
 Chemical evolution of the ocean: Lane, 06d  
 Chemical geogony: Wurtz, 70  
 Chemical geology: Crosby, 97  
 Chemung. *See* Devonian.  
 Cheneosaurus tolmanensis, Edmonton Cretaceous: Lambe, 17a  
 Chengwatona series, Minnesota: Hall (C W), 00  
 Cherry Creek district, Ariz.: Reid (J A), 06a  
 Chert. *See also* Flint.  
 Burlington limestone chert, origin: Tarr (W A), 17  
 General: Hovey, 94a; Price (W A), 18a  
 Iowa, Coal Measures: Calvin, 88c  
 Kansas, Cherokee Co.: Haworth, 83a; eastern: Haworth, 94g  
 Mississippian: Barton, 18



**Chert—Continued.**

- Missouri: Hovey, 94a; Rolla quadrangle: Lee (W), 14  
 Origin: Barton, 18; Cox (G H), 16a; Davis (E F), 18a; Haworth, 84; Keyes, 03f; Tarr (W A), 17; Van Tuyl, 18; Missouri: Dean (R S), 18  
 Osage series, origin: Van Tuyl, 12b  
 Radiolarian cherts of Franciscan group: Davis (E F), 18a  
 Chester series: Ulrich, 17  
 Chestnut Ridge disturbance: Gardner (J H), 15  
 Cheyenne sandstone, Kans.: Cragin, 90, 91  
 Cheyenne River Indian Reservation, S. Dak.: Calvert, 14  
 Chibougamau region, Que.: Barlow, 11c; Low, 06a; Obalski, 06  
 Chicago folio, Ill. (no. 81): Alden, 02  
 Chimæroid fishes: Dean, 06; Hussakof, 12a  
 Chiricahua Mountains, Ariz.: Paige, 09a  
 Chiriqui district, Panama: Evans (J W), 61  
 Chisana district, Alaska: Brooks, 14  
 Chisana-White River district, Alaska: Capps, 16  
 Chisos country, Tex.: Udden 07a  
 Chistochina district, Alaska: Moffit, 11  
 Chitina copper district, Alaska: Moffit, 08a, 12b; Storm, 10b  
 Choctaw coal field: Chance, 90a; Taff, 00  
 Chonetes: Norwood, 55a  
 Chonetes granulifer, development: Greene (F C), 08a  
 Chonophyllum: Sherzer, 92  
 Chontales mining district, Nicaragua: Feust, 12  
 Choptank folio, Md. (no. 182): Miller (B L), 12  
 Chouteau fauna, origin: Williams (H S), 96  
 Chouteau group, Mo.: Rowley, 89  
 Chriacidae, relations to primates: Earle, 98  
 Chromic iron ore.  
   California: Diller, 13a  
   General: Dieffenbach, 55a; Diller, 13a; Dolbear, 17a; Donald, 96; Glenn, 96; Harder, 09d; Obalski, 96, 98  
 Chromite.  
   Appalachian region: Glenn, 96a  
   British Columbia, Tulameen district: Camsell, 13; Yale district: Camsell, 10b  
   California: Aubury, 06; Boalich, 17; Bradley (W W), 18; Diller, 17a; Harder, 10a  
   Canada: McLeish, 10, 14; Malcolm, 18; Young (G A), 09  
   General: Diller, 17a, b; Newcomb, 17; Phalen, 12b; Pratt, 98c, 99; Ries, 17b; Williams (J C), 18; Watson (T L), 12c  
   North Carolina: Pratt, 05  
   Ontario, Lake Abitibi region: White (H T), 10  
   Origin and composition: Pratt, 98c  
   Quebec: Denis, 12a; Dresser (J A), 09c, 10b, c, 17a; Edwards (W H), 06; Harvie, 13; Strangways, 08  
   Thetford-Black Lake district (Coleraine sheet): Knox, 17  
   United States: U S G S, 83  
 Chronology, North America: Schuchert, 14e  
 Chrysochloridae: Matthew (W D), 06b  
 Chrystocrenes: Tyrrell, 10b  
 Cienegas, southern California: Hilgard, 92  
 Cimarron series: Cragin, 97

**Cimoliasaurus: Williston, 06a**

- Cincinnatian anticline: Davis (W M), 00e; age: Foerste, 91, 99, 00a, 01, 02b, 04b; Shaler, 87a; southern Ky.: Foerste, 02  
 Cincinnati group: Walcott, 83; Tennessee: Foerste, 03a  
 Cincinnati series of Indiana: Cumings, 08  
 Cincinnati Silurian island: Miller (A M), 98  
 Cincinnati. *See* Ordovician.  
 Cinnabar deposits, genesis: Christy, 79  
 Circle quadrangle, Alaska: Prindle, 06a  
 Circle Precinct, Alaska: Brooks, 07c  
 Circumcontinental growth; Chamberlin (T C), 13  
 Cirques.  
   California, Sierra Nevada: Matthes, 15b  
   Evolution: Chamberlin (T C), 11b  
   Formation: Andrews (E C), 10; Davis (W M), 11; Hobbs, 10b  
   General: Brown (R M), 05  
   Glacial, Mount Whitney region: Durst, 08  
   Massachusetts, Mount Toby: Emerson, 03, 11  
   Montana, Crazy Mountains: Mansfield, 09  
   New Hampshire, White Mountains: Goldthwait, 13, 16  
   White, Adirondack, and Catskill Mountains, Johnson (D W), 17  
 Cirques and U-shaped mountain valleys: Coleman 13h  
 Cirrepedia.  
   Balanus, Pleistocene: Dawson (J W), 89c  
   Barnacles, Paleozoic: Clarke (J M), 96  
   California, Miocene: Conrad, 77a  
   Cambrian: Matthew (G F), 96  
   Lepidocoleus, Devonian, Ill.: Savage, 13b  
   Massachusetts, Miocene barnacles: Cushman, 04c  
   New York, Devonian: Clarke (J M), 82a  
   Niobrara beds, Kansas: Logan, 97a  
   Panama Canal Zone: Pilsbry, 18  
   Protobalanus, Marcellus shale, N. Y.: Whitfield, 89b  
   Tamiosoma: Dall, 02a  
   Turrilepas, Utica formation, Ontario: Woodward (H), 89  
 Citronelle formation: Matson, 16  
 Cladoselache: Dean, 94  
 Claosaurus: Marsh, 93a; restoration: Beecher, 02c  
 Clarion quadrangle, Pa.: Lines, 07, 07a; Shaw (E W), 11 j; oil and gas fields: Munn, 10a  
 Clark, W. B., biography: Berry, 17j; Clarke (J M), 18d; Mathews, 18; Anon, 15  
 Classification.  
   Alluvial gold deposits, Alaska: Purington, 05  
   Anthracite, Pennsylvania: Ashburner, 86i  
   Archean: Coleman, 02e  
   Arkose deposits: Barton, 16  
   Arthropoda: Kingsley, 94  
   Blastoidea: Hambach, 03  
   Brachiopoda: Chapman (E J), 58  
   Breccias: Norton, 17  
   Cambrian: Walcott, 86a  
   Cephalopoda: Hyatt, 93  
   Clay: Beyer, 04; Butler (G M), 15  
   Coal: Campbell (M R), 05a; Frazer, 77c, 06a; Grout, 09a  
   Coastal forms: Gulliver, 99  
   Copper: Butler (B S), 12a



## Classification—Continued.

Cretaceous of Continental Divide: Carstarphen, 11  
 Crinoidea: Chapman, 83; Miller (S A), 89a  
 Crystalline rocks: Haworth, 95  
 Crystals: Swartz, 09  
 Devonian, Upper: Williams (H S), 86  
 Dinosauria: Marsh, 81h  
 Echini: Jackson (R T), 12  
 Economic geologic deposits: Crosby, 94b, 95a  
 Eruptive rocks, Tertiary: Szabó, 79  
 Faulting: Reid (H F), 13a  
 Gastropoda: Grabau, 12  
 Geologic deposits: Raymond (R W), 94  
 Geologic facts: McGee, 91d  
 Geologic formations of America: Marcou, 88  
 Geologic materials: Grout, 09  
 Geologic phenomena: Keyes, 98b  
 Geologic processes: McGee, 88d  
 Geologic surfaces: Johnson (R H), 15b  
 Glacial period: Upham, 95a  
 Hydrocarbons: Eldridge, 01; Hutchison, 11  
 Igneous rocks: Adams (F D), 91a; Cross, 10a; George (H C), 10; Johannsen, 17; Johnson (J E), 12; Rice (E R), 10; Turner (S), 07; Tyrrell (G W), 14; Waitz, 09; Washington, 00b; Wicks, 10  
 Iowa, drift, subdivisions: Calvin, 97c  
 Lake basins: Davis (W M), 82  
 Lavas: Shaler, 80a  
 Lithology: Chamberlin, 82a  
 Madreporaria Fungida: Vaughan, 05  
 Mammalia: Osborn, 10  
 Mesozoic Mammalia: Osborn, 87a, 88a  
 Metamorphic rocks: Miller (W J), 17b  
 Metamorphic strata, Appalachian region: Rogers (H D), 57  
 Metamorphism: Daly (R A), 17  
 Meteorites: Foote Min. Co., 12; Shepard, 67  
 Mineral deposits: Raymond, 70a  
 Mineralogical, of gradational rocks: Lincoln, 13  
 Minerals: Chapman (E J), 04, 57b; Endlich, 74a; Foye, 75; Penfield, 03; Rio, 34; Tassin, 99; native element: Wherry, 17d  
 Mountain ranges: Upham, 91g  
 Mountains: Rice (W N), 05  
 Nonmetallic minerals: Merrill (G P), 01  
 Ontario drift deposits: Coleman, 09c  
 Ore deposits: Emmons (S F), 03e; Kemp, 92b; Keyes, 00d, 01g; Newberry, 80a; Quirke, 17a; Raymond (R W), 85; Tovote, 18; Weed, 03e, g, 12b  
 Boulder batholith, Mont.: Billingsley, 17  
 gold-silver: Lindsley, 14  
 zenogynous: Hastings, 95a  
 Pelecypoda: Hall, 84b  
 Permian: La Forge, 12  
 Petroleum and natural gas fields: Clapp (F G), 10a, 17  
 Pisces: Cope, 78m  
 Pleistocene deposits, genetic classification: Chamberlin, 93e, 94b; McGee, 93c  
 Post-Cretaceous: Heilprin, 87c  
 Pre-Cambrian: Adams (F D), 15; Coleman, 15; Hunt, 85a; Tyrrell, 15b; Van Hise, 09; Ontario: Miller (W G), 15a  
 Publiclands: Smith (G O), 13

## Classification—Continued.

Quantitative classification, modifications of: Cross, 12b  
 Reptilia: Osborn, 03, 04g, 05m; Williston, 17a  
 Rivers: Davis (W M), 90a  
 Rocks: Barrell, 10; Bonney, 79; Grabau, 03e, 04c; Lord (E C E), 07; Wadsworth, 79, 84  
 igneous: Cross, 03  
 massive: Bayley, 88b  
 original: Macfarlane, 80  
 textures and structures: Crosby, 82  
 Sand dunes: Haltenberger, 13  
 Sedimentary rocks: Grabau, 04a  
 Sediments: Trowbridge, 14  
 Silicates: Hunt, 85b  
 Symbols in quantitative classification: Cross, 12a  
 Testudinata, marine: Wieland, 02  
 Trilobites: Beecher, 97a; Chapman (E J), 56, 90  
 Underground volatile agents: Daly (R A), 17a  
 Ungulata: Cope, 83ze  
 Useful minerals: Wadsworth, 94  
 Valleys: Powell, 74a  
 Waters, chemical classification: Palmer (C), 11  
 Volcanoes, active: Jagger, 10b  
 Clasticsediments, mechanical composition: Udden, 14c  
 Clavilithes, Eocene, Texas: Johnson (C W), 02  
 Clay. *See also* Fire clay; *and names of clay-producing States.*  
 Albany slip clay: Jones (R W), 16  
 Aluminum hydrates in clays: Edwards (M G), 14; Ries, 14e  
 Analysis: Ries, 99c  
 Appalachian States, southern: Watkins, 15  
 Bibliography: Branner, 96, 06a  
 Canada, western provinces: Ries, 14b  
 Classification: Beyer, 04; Butler (G M), 15  
 Colloid matter of clay: Ashley, 09  
 Composition, rational: Ries, 07a  
 Constitution: Merrill (G P), 02a  
 Deposition: Hunt, 74d  
 Dolomitic clay, Texas: Ries, 17a  
 Formation of residual clay: Buckman (H O), 11  
 General: Buckley, 01; Crider, 13a; Eckel, 12; Hance, 13a; Hill (R T), 93e; Orton, 93b; Richardson (C H), 17; Ries, 07, 12; Wheeler, 96; Wilber, 85  
 Geologic distribution: Ries, 03  
 Geological investigation: Ries, 09  
 Geology: Beyer, 04a; Rolfe, 08; Soper, 12  
 High-grade American clays, occurrence: Ries, 18  
 Kaolins, white residual, origin: Ries, 11b  
 Microscopic organisms in clays: Ries, 94d  
 Mineralogical constituents: Fry, 15  
 Origin: Davis (N B), 15; Beyer, 04; Hill (R T), 93e; Loughlin, 05; Ries, 03; Stout, 15  
 New York, Long Island: Merrill, (F J H), 99  
 Piedmont clays: Ries, 17  
 Plasticity: Davis (N B), 15  
 Prospecting and testing clay deposits: Soper, 10  
 Technology: Beyer, 04  
 Term 'colluvial': Veatch (J O), 06  
 United States: Hill, 93e; Ries, 97, 06; U S G S, 83; Wilber, 85; east of Mississippi River: Ries, 03



## Clay—Continued.

- Varieties, occurrence: Hance, 13a  
 Volcanic dust, clay derived from, Pierre formation, S. Dak.: Wherry, 17e
- Clay dunes: Coffey, 09
- Clay seams in coal, Kans.: Crane, 96
- Clay seams near Springfield, Ill.: Savage, 09a
- Clay slips, origin: Wilson (W B), 16
- Clay veins in coal beds: Gresley, 98
- Claypole, E. W., biography: Comstock, 02, 03; Winchell (N H), 01b
- Claysville folio, Pa. (no. 180): Munn, 12
- Claysville quadrangle: Griswold, 07a
- Clayton quadrangle, N. Y.: Cushing, 10a
- Clear Creek, Colo.: Underhill (J), 06
- Clearfield coal field, Pa.: Ashley, 06a
- Clear Fork beds, Tex.: Case (E C), 07c
- Cleavage.  
   General: Rogers (H D), 58d; Teschemacher, 48a  
   Slaty cleavage: Becker, 04, 07a  
   Structure resembling stretched pebbles: Phalen, 10a  
   Theories of: Barrell, 07; Becker, 07a; Willis, 07f
- Cleveland folio, Tenn. (no. 20): Hayes, 95a
- Cleveland shale, Ohio: Cushing, 12; Prosser, 13
- Cliff erosion, effect on form of contact surfaces: Fenneman, 05c
- Cliff Lake, Mont.: Mansfield, 11
- Cliffs, glacial origin: Davis (W M), 89e
- Cliffwood clays: Knapp (G N), 04a; flora: Berry, 06d
- Clifton folio, Ariz. (no. 129): Lindgren, 05
- Clifton-Morenci district, Ariz.: Lindgren, 05a; Tovote, 10
- Climate, influence on ore formation: Aubouin, 17
- Climate, Geologic. *See* Paleoclimatology.
- Climate and terrestrial deposits: Barrell, 08
- Climatic pulsations, lithologic evidence: Vail, 17
- Climatic types of sediment: Blackwelder, 17a
- Climatic nites, tracks of: Hitchcock (C H), 08c
- Clinopanes, Rio Grande: Herrick, 04a
- Clinton district, Mont.: Rowe, 10e
- Clinton formation, N. Y.: Newland, 09
- Clinton fossil ore.  
   Alabama: Eckel, 06b  
     Birmingham district: Burchard, 08, 08b, 10c  
     Lookout Mountain: Bowron, 05  
   General: Ball (S M), 09; Rogers (W B), 58a; Smyth (C H), 92a, 11a  
   Genesis: Earle, 14  
   Georgia: McCallie, 10  
   Maryland: Singewald, 09, 11  
   New York: Higgins, 08; Newland, 08a  
   Pennsylvania: Kelly, 09  
     Stone Valley: Rutledge, 08  
   Virginia: Eckel, 06c
- Clintwood quadrangle, Va.: Hinds, 16
- Cloud Peak quadrangle, Wyo. (folio no. 142): Darton, 06d
- Clove Valley Pleistocene lake basin: Gratacap, 01a
- Clymenia fauna in American Devonian: Raymond (P E), 12
- Coal. *See also* Anthracite; Lignite; and names of coal-producing States.  
   Accumulation, Perry Co., Ohio: Hyde, 12a  
   Accumulation of vegetable matter: Savage, 14

## Coal—Continued.

- Allegheny field: Roy, 76b
- Alteration of vegetable matter into coal: Dowling, 10c
- Analyses: Campbell (M R), 14a, 16; Fieldner, 14; Jackson, 36; Lord, 13; Newberry, 74y; Pope, 16; U S G S, 12; White (I C), 10; Iowa: Hixson, 14
- Appalachian, northern, field: Hosler, 10; Ramsay, 96; White (D), 02
- Appalachian, southern, field: Hayes, 02b
- Appalachian and eastern interior coal fields, relations: Ashley, 07a
- Barren zone of northern Appalachian field: White (I C), 09a
- Burning of coal beds in place: Bowie, 14; Rogers (G S), 17
- Canada: Denis, 03a; Dick, 14; Dowling, 15; Pruvost, 13; Rogers (H D), 58f; eastern: Gray, 17
- Cannel coal, United States: Ashley, 18; Macfarlane, 90; formation: Newberry, 57a
- Classification: Campbell (M R), 05a, 17a; Collier, 09; Dowling, 08a, b; Frazer, 77c, 06a; Gordon (J M), 13; Grout, 09a; Lesley, 79; McCallum, 08; of low-grade coals: Campbell (M R), 08b; Grout, 08a
- Clay slips, origin: Wilson (W B), 16
- Coal beds, formation of: Gresley, 88; Nathurst, 88; Rogers, 43b; Stevenson, 11, 13; Wardroper, 88; White (D), 13d  
   identification: Rothwell, 73  
   structural features: Bain, 95e
- Coal fields, formation of: Ford (J), 06  
   map: Hitchcock (C H), 74a
- Coal seams, parallelism: Newberry, 74d; spore-exines of: Thiessen, 18
- Coal-testing: Holmes, 06; Parker, 06
- Composition: Grout, 07; Jeffrey, 14; White (D), 15a
- Conglomerate series: Chance, 81b
- Correlation of coals: White (D), 06a
- Cost: Smith (G O), 17
- Deposition, rate of: Ashley, 07; maximum, in Appalachian field: Ashley, 06c
- Devolatilization of coal, regional: White (D), 10
- Eastern interior coal field: Cox (E T), 71a
- Effect of oxygen in coal: White (D), 09
- Flexures in coal basins: Rogers (H D), 54a
- Formkohle, origin: Stevenson, 17
- Fossil fuels, interrelations: Stevenson, 16
- Gases in coal: Darton, 15a
- General: Ashburner, 86j; Cosgrove, 16; Daddow, 66; Darton, 15a; De Bow, 51; Gilbert (C G), 17, 18; Hitchcock (C H), 72c; Höfer, 78; Kemp, 03g; Le Conte, 58; Lesley, 56; Macfarlane, 73; McInnes, 13; Maxwell, 58; Mitchell, 10a; Nicolls, 97; Parker (E W), 92; Pa. Gen As, 34; Rogers (H D), 58b; Roy, 76; Sheaffer, 80; Stevenson, 16; Stock, 12; Taylor (R C), 48; Tonge, 07
- Geologic position: Whitney, 67e
- Investigation: Jeffrey, 14a
- Isogeotherm hypothesis of origin: Plotts, 05, 11, 16
- Land classification: Smith (G O), 13



## Coal—Continued.

- Lignite beds, Rocky Mountain region, formation: Lesquereux, 74c; western America: Newberry, 74e
- Lignite beds and underclays: Hilgard, 74
- Lignitic formations, Rocky Mountains, age: Lesquereux, 74e
- Markings on coal: Lewis (S), 55a
- Metamorphism: Bolton, 96; Gottschalek, 10; regional, representation of: White (D), 09d
- Microorganisms: Renault, 99
- Microscopic study in relation to sapropelic hypothesis: Jeffrey, 10b
- Mine sampling and chemical analyses: Burrows (J S), 08
- Mississippi Valley: Owen (D D), 46
- North America: Rogers (H D), 56
- Ohio Valley coal fields, original connection of eastern and western: Shaler, 87a
- Origin and distribution: Clark (W B), 05
- Origin and formation: Am G, 88a; Berthoud, 79; Bowen (E), 62; Burroughs, 13c, 14a; Calvin, 81; Chance, 08a; Cooper (T), 81; Coste, 09; Dawson (J W), 66; Dowling, 09a, 10b, c, 11; Fairchild, 82; Forstall, 92; Gazlay, 30; Gresley, 99; Gwillim, 05a; Hixon, 08b; Jeffrey, 13a, 14a, 15, 17; Lane, 02g; Lesquereux, 58, 59a, 60b, 66, 86; Lyell, 53a; Newberry, 82, 83; Orton, 85a, 93c; Page, 93; Penhallow, 92b; Plotts, 05; Rogers (H D), 43b, 54d, 58b; Roy, 75, 83; Silliman, 30a; Stevenson, 16a; Thiessen, 12; Twenhofel, 10; Udden, 10a; White, (D), 08, 08b, 13d, 15a; Whittlesey, 52a
- different grades: Campbell (M R), 05; Smith (W D), 06
- Massillon coal, Ohio: Newberry, 83b
- sapropelic hypothesis: Jeffrey, 13
- Oxygen, effect in coal: White (D), 09
- Pacific coast: Brown (R), 70
- Parallelism of coal seams: Andrews (E B), 74a; Newberry, 74d; alleged: Stevenson, 75a
- Parallelism of eastern and western interior coal fields: Keyes, 17g
- Peculiarities of coal seams: Roy, 87
- Plant remains composing coals: Thiessen, 11
- Problems in the study of coal: Orton, 85a
- Proximate analyses: Campbell (M R), 11b
- Pressure in the formation and alteration of coal: Dowling, 09d
- Production: Parker, 08
- Rate of deposition: Ashley, 09b
- Reserves of world: Dowling, 14
- Resin in Paleozoic coals: White (D), 09c, 12c, 13e, 14
- Resinous nature: Teschemacher, 52a
- Rocky Mountain region: Hayden, 68a; Hills (R C), 15; Storrs, 02
- Roots in underclays: White (D), 13b
- Shortage of coal in northern Appalachian field: White (I C), 09
- Southern States: Glenn, 09; Head, 97
- Southwestern coal field: Taff, 02a
- Stratigraphy of coal beds: Keyes, 94f
- Structure: Johnson, 41c; Tonge, 14; Wethered, 84, 85; and formation: Jeffrey, 16

## Coal—Continued.

- Texture, relation to composition: Grout, 11
- Tonnage, Ohio: Clark (F R), 17
- United States (general): Aichino, 15; Ashburner, 86j; Ashley, 05c; Baum, 08; Bell (I L), 75; Boyd (E F), 76; Campbell (M R), 06d, 09, 13, 17, 17a; Griffith, 06; Hayes, 02a, 03g; Hitchcock (C H), 73f; Macfarlane, 74; Parker, 05; Prime, 86; Ritter, 06b; Rogers (H D), 58f; Stevenson, 16; U S G S, 83; map of coal fields: Campbell (M R), 08a
- Valuation of coal land: Ashley, 10; Fisher (C A), 10
- Variations of seams: Roy, 88
- Vegetable structure: Dawson (J W), 59b
- Water content: Mack, 17
- Waving of the coal measures: Roy, 88
- Western coal deposits: Kirk (C T), 17
- Western interior field: Bain, 98h, 02a; Keyes, 98k, 00g, 01k, 1; Van Tuyl, 16i
- Coal apples, Pennsylvania: Gresley, 93
- Coal lands: Calvert, 11
- Coal Measures. *See* Carboniferous.
- Coaldale coal field, Nev.: Hance, 13
- Coalinga oil district, Cal.: Arnold, 08g, 09a, 10; Forstner, 09b
- Coalville coal field, Utah: Wegemann, 15
- Coast lines.
- Atlantic Coastal Plain: Abert (S T), 76
- Carolina coast: Abbe, 95
- Coast erosion: Gulliver, 96; La Gorce, 15
- General: Curtis, 98; Davis (C H), 49; Haupt, 89
- Lowland, types: Gulliver, 96a
- Massachusetts: Davis, 96b; Gulliver, 04; Woodworth, 93a
- Mexico, Lower California: Wittich (E), 101
- Nantucket, shore line changes: Barnard, 99
- New Jersey: Johnson (D W), 14; Woodman, 96, 96a; southern: Coman, 91
- New York Bay: Haupt, 05
- North Carolina: Welch, 86a
- Hatteras Island: Cobb, 03
- Hatteras Inlet: Welch, 86
- Sandy Hook: Bache, 45
- Texas, Galveston: Howell (C W), 74
- Tides, geologic action: Davis (C H), 49a
- Virginia, Cape Henry, sand hills: Latrobe, 99
- Coast Range, Cal.: Le Conte, 76
- Coastal forms, classification: Gulliver, 98, 99
- Coastal Plain stratigraphy: Clark (W B), 06d, 09a
- Crosby, 12
- Coastal sand formations: Olsson-Seffer, 10
- Coastal stability: Johnson (D W), 14a
- Coatesville quadrangle, Pa.: Bliss (E F), 14
- Cobalt: Wharton, 97
- Canada: Young (G A), 09
- Lateritic ore deposits: Miller (W G), 17a
- United States: U S G S, 83
- Cobalt district. *See* Ontario.
- Cobalt series: Wilson (M E), 13
- Coblentzian invasion: Clarke (J M), 07
- Cobscook Bay, Me.: Shaler, 86
- Cochise mining district, Ariz.: Kellogg, 06
- Cochita mining district, N. Mex.: Statz, 12b
- Cochiti district, N. Mex.: Barbour (P E), 08
- Cockeysville marble: Mathews, 05a
- Cockroaches: Scudder, 95



**Codonothea:** Sellards, 03b

**Coelenterata.** *See also* Anthozoa; Hydrozoa; Invertebrata.

Arctic islands: Lambe, 06

Franklin: Lambe, 06

Index fossils: Grabau, 06a

Maryland, Devonian: Clarke (J M), 13e; Prosser, 13b; Swartz, 13b

Moorefield shale fauna: Girty, 11

New York, Helderberg: Girty, 97

Polyphyletic genera: Grabau, 13h

Tetradium: Safford, 56b; Canada: Foord, 83; Raymond (P E) 13g

Coeur d'Alene district, Idaho: Auerbach, 08, 08a; Ransome, 08

Coffee Creek district, Cal.: Stines, 07

Coke, natural.

Utah: Taff, 06d

Virginia, eastern: Rogers (W B), 42b

Colemanite, origin: Gale, 13

Colfax folio, Cal. (no. 66): Lindgren, 00

Colgate folio, Okla. (no. 74): Taff, 01

Colima: Sabatini, 08

**Collections.**

American Museum: Hovey, 00i

Canada Geological Survey collection, catalog: Hoffmann, 93

Geological and mineralogical collections in U. S., and Canada: Merrill (F J H), 98b

Indiana, State museum, catalog: Thompson (M), 89d

Lacoc collection, catalog: Anon, 00a

Maine, Colby University: Bayley, 90

South Carolina College: Martin (D S), 06

White collection, University of Michigan: Winchell (A), 64c

Colloid matter of clay: Ashley, 09

Colloidal migration in ore deposits: Clark (J D), 16

Colluvial clay: Veatch (O), 06

Colob coal field, Utah: Richardson (G B), 09a

Color in Paleozoic fossils: Keyes, 90f; Marsh, 69a

Color in the Vernon shale: Miller (W J), 10a

Color of rocks: Rogers (W B), 56

**Colorado.**

Alkali lakes of San Luis Valley: Fleck, 05

Alkalies: Headden, 18

Atlas: Hayden, 77c

Bibliography: Jones (O M), 14

Charcoal in depth, Silver Cliff district, Custer Co.: Charlton, 90

Colorado Springs region: Finlay (G I), 06

Clear Creek district: Henning, 10

Cripple Creek district, topographic model: Byler, 13

Excursion: Van Hise, 01d

Foothills region: Conkling, 77b

Fulgurite, Spanish Peaks: Hills, 91b

General: Berthoud, 66; Emmons (S F), 85, 93; Hayden, 76e, 77; Hills, 89b; Newberry, 81a; Peale, 73; Pošepný, 77; Rath, 85l

Geological survey, report: George (R D), 09a

Geology of Moffat tunnel: Bancroft (G J), 13a

Historical development: Rickard, 08

Infusorial earth, West Denver: Headden, 88

Leadville, Downtown district, map and cross-sections: Emmons (S F), 06b

Middle Park and Gore Canyon: Henning, 08a

**Colorado—Continued.**

Northwestern Colo.: Henderson (J), 10

Red soils, origin: Cross, 08a

Rocky Mountain region: Foster, 72

San Juan region: Cross, 99; McCauley, 78; Stevens (R P), 86

Southwestern Colo.: Comstock, 86a

Steamboat Springs: Witter, 99

Trachytic boulder: Pearce, 04

Ute country: Prout, 74

**Economic geology.**

Alma district, Park Co.: Patton, 12

Alunite deposits, Rosita Hills: Cross, 12; San Cristobal quadrangle: Larsen, 13

Animas Forks, Gold Prince mine: Scholl, 07

Anthracite, Elk Head field, Routt Co.: Chisolm, 87

Anthracite-Crested Butte quadrangles: Eldridge, 94

Apishapa quadrangle: Stose, 12

Aspen district, Pitkin Co.: Emmons (S F), 88c; Lakes, 87; Newberry, 90; Sivyver, 88; Spurr, 98, 09a

Aspen Mountain, Pitkin Co.: Brunton, 88; Henrich, 89

Asphalt: Stone (G H), 91; Middle Park: Lee (H A), 99

Battle Mountain district, Eagle Co.: Olcott, 87

Bear Creek ore deposits: Emmons (W H), 06; Prosser (W C), 11a

Bonanza district, Saguache Co.: Patton, 16

Boulder Co.: Bagg, 03, 03a; Farish, 91; Hallowell, 82; Tovote, 06a; Van Diest, 87; vein phenomena: Farish, 91a; Van Diest, 87a

Boulder district: Fenneman, 05b; Rickard, 03b

Boulder oil field: Washburne, 09a

Breckenridge district: Ransome, 11

Brush Creek region: George (R D), 13a

Building stone: Bailar, 08

California district: Freeman (H C), 85

Carnotite: Curran, 271; Hillebrand, 05; Moore (R B), 13; Phillips, (A H) 04

origin: Hess, 14a

Paradox Valley: Curran, 11

Rio Blanco Co.: Gale, 07

Routt Co.: Gale, 08a

southwestern Colo.: Kithil, 17

Carson camp, Hinsdale Co.: Larsen, 11

Cashin mine: Emmons (S F), 06a

Castle Rock quadrangle: Richardson (G B), 15

Cebolla district, Gunnison Co.: Singewald, 12b

Cement materials: Eckel, 13; Martin (G C), 09

Central City quadrangle: Bastin, 17

Cerussite, Custer Co.: Hunter, 14a

Chalcocite and fluorspar, Jefferson Co.: Patton, 15a

Clay: Bailar, 08; Rics, 98b

Durango-Gallup field: Shaler, 07a; eastern Colo.: Butler (G M), 15; El Paso Co., Calhan: Richardson (G B), 11

Coal: Headden, 07, 07a; Hills, 93; Lakes, 89, 91, 04a, 05g, 06, 08; Marvine, 74; Merriam (L B), 03; Newberry, 88d; Ritter, 06b

Anthracite-Crested Butte quadrangles: Eldridge, 94

associated with silver, Ouray Co.: Hallowell 82b; Koenig, 81a



## Colorado—Continued.

*Economic geology—Continued.*

- Coal: Barela Mesa field: McLaughlin, 03  
 Book Cliffs field: Richardson (G B), 07a, 09b  
 Canon City field: Clark (R N), 73; Stevenson, 82; Washburne, 10a  
 Carboniferous, Aspen and Glenwood Springs: Hills, 86  
 central Colo.: Whiteside, 12a  
 Colorado Springs field: Goldman, 10  
 Crested Butte, Gunnison Co.: Lakes, 86a  
 Danforth Hills and Grand Hogback: Gale, 07a  
 Denver Basin: Eldridge, 89; Emmons (S F), 96; Martin (G C), 10  
 Durango district: Taff, 07  
 Durango-Gallup field: Shaler (M K), 07b  
 Durango-Monero field: Gardner, 09a  
 Elmore quadrangle: Hills, 99  
 Front Range: Whiteside, 12b  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand Mesa field: Lee (W T), 09  
 Grand River: Thiele, 82  
 Gunnison Co.: Hallowell, 83a  
 Gunnison Valley: Woodruff, 12b  
 La Plata Co.: Clayton, 78  
 lignite fields: Pierce, 12  
 Middle Park: Mallett, 75  
 Newcastle, Garfield Co.: Hosea, 97  
 North Park: Beekly, 15  
 northwestern Colo.: Gale, 07a, 09, 10; Hewett, 89  
 Ouray quadrangle: Cross, 07a  
 Pictou: Meade (F), 00  
 Routt Co.: Fenneman, 06b; Parsons (H F), 03; Headden, 07; Herrick (R L), 08a  
 southeastern Colo.: Van Diest, 90a  
 southern Colo.: Gardner, 75  
 South Park field: Washburne, 10  
 Spanish Peaks quadrangle: Hills, 01  
 Tercio district: Plumb, 05  
 Tertiary: Hodge (J T), 71  
 Trinidad region: Endlich, 77; Goodnow, 83; Lakes, 86; Richardson (G B), 10; Whiteside, 12  
 Walsenburg quadrangle: Hills, 00  
 Yampa field, Routt Co.: Campbell (M R), 06e; Fenneman, 06b; Weston, 14; Whiteside, 17  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Copper: Snedaker, 07; Weed, 06.  
 Carson camp, Hinsdale Co.: Larsen, 11  
 Chaffee, Fremont, and Jefferson cos.: Lindgren, 08c  
 Evergreen deposit, Gilpin Co.: Bastin, 11c; Ritter, 07a, 08  
 Cripple Creek district: Liebenam, 04; Lindgren, 06, 06d  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Montezuma district, Summit Co.: Patton, 09  
 Montrose Co., Cashin mine: Emmons (W H), 06a  
 Pearl district: Read, 04a; Spencer (A C), 03a  
 Rico district: Ritter, 13  
 Sangre de Christo Range: Baggs, 08a

## Colorado—Continued.

*Economic geology—Continued.*

- Copper: Unaweep district: Butler (B S), 14b  
 Creede district: Emmons (W H), 13d; Kirby, 92; MacMechen, 92  
 Crested Butte, Gunnison Co.: Lakes, 86a  
 Cripple Creek district: Colburn, 13a; Hazelhurst, 00; Lakes, 95a; Lindgren, 04d, 05d; Moore (C J), 01; Penrose, 95, 98; Rickard, 96, 00, 01, 03c; Ritter, 05; Skewes, 95, 95a, 97; Stevens (E A), 03  
 Cresson bonanzas: Patton, 17  
 Independence mine: Schwarz (T E), 95  
 replacement deposits: Colburn, 13  
 Custer Co.: Emmons (S F), 96a; cerusite deposit: Brinsmade, 07a  
 De Beque, Mesa Co., petroleum field: De Beque, 14; Woodruff, 13a  
 Denver Basin: Eldridge, 89; Emmons (S F), 96  
 Durango quadrangle: Emmons (W H), 05  
 Eagle Co.: Tilden, 87  
 Eagle, Grand, and Gunnison valleys: Peale, 76  
 Eastern Colo.: Elliott, 71  
 Elk Mountains: Emmons (S F), 94  
 Elmore quadrangle: Hills, 99  
 Enrichment, Cripple Creek: Bancroft, 02; Weed, 03h  
 Santa Rita district: Baggs, 04  
 Fall River district, Alice mine: Herrick (R L), 09  
 Fissures, Telluride district: Purington, 05b  
 Fluorspar: Burchard, 09b; Mineral Co.: Lunt, 15  
 Fourmile district: Snow, 95  
 Garnetiferous bed, Golden Gate Canyon, Jefferson Co.: Bailey (E W), 05  
 General: Bliss (E), 64; Carroll, 16; Dalzell, 09, 11; Emmons (S F), 85; Foster (E L), 85; Frazer, 69; Hague (J D), 70; Hayden, 69; Henahan, 13, 14; Lakes, 88, 93, 97a, 04e, 05; Lee (H A), 98, 03; Old, 69, 72; Rath, 85l; Smith (J A), 67, 81, 83; White (E L), 07; Whitney (J P), 67  
 Geologic horizon of ores: Hayden, 76d  
 Geological distribution of precious metals: Rickard, 10  
 Georgetown district: Foster (E L), 02; Spurr, 05a, 08  
 Georgetown quadrangle: Ball (S H), 06  
 Gilpin Co.: Bastin, 15a, b, 16, 17; Rogers (A N), 83; Rickard (F), 99  
 ore bodies, origin: Becker (C M), 14a  
 pitchblende: Tovote, 06  
 Gold: Bliss (E), 64; Hayden, 69; Lindgren, 06; Silliman (jr), 74  
 Alma district: Patton, 12  
 Battle Mountain: Guiterman, 91  
 Bear Creek sylvanite camp: Emmons (W H), 06; Prosser (W C), 11a  
 Boulder Co.: Farish, 91; Lindgren, 07b; Roland, 78  
 Breckenridge district: Bradford (A H), 09; Crow, 01; Ransome, 11  
 Carson camp, Hinsdale Co.: Larsen, 11  
 Costilla Co., Grayback district: Patton, 10a



## Colorado—Continued.

*Economic geology—Continued.*

Gold: Cripple Creek: Blake (W P), 94b; Lakes, 94, 95a; Liebenam, 04; Lindgren, 06d; McCarn, 94; Patton, 15, 15b, 17; Pearce, 98, 98a; Penrose, 95, 98; Rickard, 96, 99, 01a, 02; Ritter, 05; Skewes, 97  
 Custer Co.: Emmons (S F), 96a  
 Fall River district, Alice mine: Herrick (R L), 09  
 Geologic distribution: Hayden, 76d; Rickard, 10  
 Georgetown quadrangle: Spurr, 08  
 Gold Prince mine: Scholl, 07  
 Gunnison belt: Lakes, 97, 06b  
 Gunnison Co.: Hill (J M), 09  
 Hahns Peak field: Gale, 06; George (R D), 09c  
 Idaho Springs district: Spurr, 06c  
 Lake City district: Irving, 11a  
 Lake Fork district: Woolsey, 07  
 La Plata Mountains: Toll, 08  
 Lay, Routt Co.: Gale, 08  
 Leadville: Argall, 34; Blow, 95; Boehmer, 10; Butler (G M), 12b  
 Monarch and Tomichi districts: Crawford, 13  
 Montezuma district, Summit Co.: Patton, 09; Ritter, 08a  
 Mosquito district, Park Co.: Moore (C J), 13  
 Newcastle: Rickard (F), 09; Rickard (T A), 09  
 Newlin's Gulch: Butler (G M), 12a  
 Ouray quadrangle: Cross, 07a; Endlich, 89  
 Park Co.: Sadtler, 97; Fourmile district: Hoover, 97  
 Platoro-Summitville district: Patton, 18  
 Plomo, San Luis Park: Gunther, 05  
 primary, in granite: Hastings, 08  
 Rico Mountains: Ransome, 01  
 Routt Co.: Gale, 08; Hahns Peak region: George (R D), 09b  
 San Francisco district: Martin (A H), 09  
 San Juan: Prosser (W C), 11; Camp Bird mine: Titcomb, 02  
 Sierra Blanca, telluride ore: Pearce, 98i  
 Summit Co.: Brown (T A), 12; Hausmann, 91  
 Telluride quadrangle: Purington, 98; Winslow, 00  
 Tombstone: Shaw (S F), 09  
 Gold Brick district, Gunnison Co.: Crawford, 16  
 Golden region: Berthoud, 75  
 Gold Hill region: Marvine, 74a  
 Grahamite: Newberry, 87; Wurtz, 70b  
 Granite: Bailar, 08; Gunnison: Hunter, 14  
 Grayback mining district, Costilla Co.: Patton, 10a  
 Gunnison Co.: Hallowell, 83; Hill (J M), 09; Warren (E R), 97a  
 Gunnison district: F., 80  
 Gypsum: Lakes, 04  
 Eagle Co.: Burchard, 11  
 Larimer Co.: Lee (H A), 00  
 Perry Park: Kruger, 10  
 Uncompahgre region: Siebenthal, 06  
 Hahns Peak region: Routt Co.: Draper, 97; George (R D), 09c  
 Hot springs: Lakes, 05h  
 Idaho Springs mining district: Spurr, 06c

## Colorado—Continued.

*Economic geology—Continued.*

Iron: Chauvenet, 86, 90; Leith, 06; Rolker, 86a  
 Boulder Co.: Jennings, 12  
 Caribou: Bastin, 14b  
 Costilla Co., Grayback district: Patton 10a  
 Gunnison Co.: Chauvenet, 88; Cebolla district: Singewald, 12b, 13a  
 Lake City district: Irving, 11a  
 Lake Fork extension of Silverton mining area: Woolsey, 07  
 Leadville: Argall, 14a  
 northern Colo: Chauvenet, 87  
 Pitkin Co.: Devereux, 84  
 southern Colo.: Gardner (J T), 75  
 Taylor Peak and Whitepine deposits: Harder, 09  
 Lake City: Irving, 05b  
 La Plata Mountains: Freeman (H C), 85; Petre, 98  
 La Plata quadrangle: Purington, 99a  
 Las Animas district: Hawn (F), 74  
 Lead, Aspen: Spurr, 09a  
 Creede district: Emmons (W H), 13d  
 Custer Co.: Brinsmade, 07a; Hunter, 14a  
 Lake City district: Irving, 11a  
 Leadville district: Butler (G M), 12b; Emmons (S F), 86  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Montezuma district, Summit Co.: Patton, 09; Ritter, 08a  
 Mosquito district, London mine: Moore (C J), 13  
 Rico district: Ritter, 13  
 Leadville district: Amelung, 80; Argall, 10, 14a; Barker (F L), 07; Boehmer, 08, 10; Butler (G M), 12b; Carlyle, 93; Emmons (S F), 82, 86; Freeland, 86; Henrich, 79; Ihlseng, 88; Moore (C J), 01a; Ricketts, 83; Robbins, 03; Rolker, 86b; Rose, 13; Storms, 99b, d; Warwick, 05  
 Downtown district: Emmons (S F), 07a  
 Iron Hill: Argall, 10; Blow, 88, 90  
 origin of ores: Raymond (R W), 88; Webb, 11  
 tellurium and bismuth: Pearce, 91  
 Liberty Bell, Telluride: Anon, 09  
 Lignite fields: Lesquereux, 73; Pierce, 12; Potter, 77  
 Limestone: Martin (G C), 09  
 Lodes in Tertiary eruptives: Rickard (T A), 07c  
 Manganese: Harder, 10  
 Manganiferous iron ore, Red Cliff, Eagle Co.: Umpleby, 17b  
 Mica deposits, Mesa Co.: Sterrett, 13; Boulder Co.: Schwarz (T E), 03  
 Mineral wealth: Emmons (S F), 85a  
 Minerals, nonmetallic: Bailar, 08  
 Mining districts: Endlich, 74; Miller (G W), 08  
 Molybdenum: Fleck, 16; Climax, Summit Co.: Brown (H L), 18; Haley, 18; Holland (L F S), 18  
 Monarch district, Chaffee Co.: Crawford, 10  
 Monarch and Tomichi districts: Crawford, 13  
 Montezuma mining district, Summit Co.: Patton, 09; Ritter, 08a  
 Mosquito district, Park Co.: Moore (C J), 13



## Colorado—Continued.

*Economic geology—Continued.*

Mount Wilson district, San Miguel Co.: Nason, 00; Spaulding, 98  
 Natural gas: Lakes, 91  
   Boulder Co.: Van Diest, 88  
   Manitou: Strieby, 94  
   Pitkin Co.: Hills, 87  
 Needle Mountains quadrangle: Irving, 05  
 Nepesta quadrangle: Fisher (C A), 06a  
 Nitrate deposits: Gale, 12  
 North Park: Beekly, 15  
 Northwestern Colo.: White (C A), 78d  
 Oil fields: Lakes, 01  
 Oil possibilities: Ziegler, 18b  
 Oilshades: Adkinson, 18; Alderson, 18; Ziegler 18c  
   Grand River: Thiele, 82  
   Green River formation: Winchester, 17  
   northwestern Colo.: Chase, 18; De Beque, 16; Hoskin, 18; Winchester, 16a; Woodruff, 14b  
 Ordovician rocks: Darton, 06b  
 Ore deposition at Aspen: Loughlin, 09  
 Ore deposits: Emmons (S F), 87b  
 Ouray district: Downer, 01a; Irving, 05a; Ransome, 00a  
   American-Nettie mine: Downer, 01  
   Camp Bird mine: Purington, 03a  
 Ouray quadrangle: Cross, 07a; Irving, 05d  
 Pelican mine, Clear Creek Co.: Lawrence, 02  
 Perry Park region: Kruger, 10  
 Petroleum: Lakes, 91, 01, 01a, 02; Newberry, 89  
   Boulder field: Fenneman, 03, 04; Washburne, 09a  
   De Beque field: De Beque, 14; Woodruff, 13a  
   Florence field: Eldridge, 92; Fenneman, 05; Foote (F W), 15; Newberry, 88f, 1, 89a; Washburne, 09b  
   Fremont Co.: Ihlseng, 86; Williams (S G), 76  
   Rangely district: Gale, 08b  
   Yampa field: Fenneman, 06b  
 Pine Creek district, Gilpin Co.: McCarn, 96  
 Pitchblende ores, Gilpin Co.: Alsdorf, 16; Bastin, 14a, 16b; Fleck, 08; Hill (N P), 73; Rickard (F), 13  
 Platoro-Summitville district: Patton, 18  
 Pre-Cambrian, Georgetown quadrangle: Ball (S H), 06  
 Providence district, Boulder Co.: Van Diest, 95a  
 Pueblo quadrangle: Gilbert, 97  
 Pyrite, Leadville: Lee (H S), 18  
 Radium: Parsons (C L), 14  
 Rangely oil district, Rio Blanco Co.: Gale, 08b  
 Rare metals: Fleck, 08; Boulder Co.: Wood (J R), 10  
 Red Cliff region, Colo.: Means, 15  
 Red Mountain district, Ouray Co.: Comstock, 89; Kedzie, 88; Schwarz, 89, 90, 97, 05  
 Rico district: Ritter, 13  
 Enterprise mine: Rickard, 97, 98a  
 Newman Hill: Farish, 92  
 Rico Mountains: Ransome, 01  
 Rico quadrangle: Cross, 05a  
 Rosita district: Clark, 79; Emmons (S F), 97b  
 Rosita Hills, Custer Co.: Cross, 91b

## Colorado—Continued.

*Economic geology—Continued.*

Routt Co.: Fenneman, 06b; Parsons (H F), 03  
 Sangre de Cristo Range, Costillo Co.: Van Diest, 98  
 San Juan region: Comstock, 83, 84; Endlich, 75, 76; Howe, 06; Ihlseng, 86; Purington, 05a; Read, 08; Reed, 11; Rickard, 03a; Virginus mine: Emmons (S F), 04b; Purington, 03d  
 Seaton mine: Underhill, 97a  
 Silver: Hayden, 69; Matteson, 11; Rickard (T A), 07e  
   Aspen district: Spurr, 98, 09a  
   Bear Creek: Emmons (W H), 06  
   Boulder Co.: Rolland, 78  
   Breckenridge district: Ransome, 11  
   Carson camp, Hinsdale Co.: Larsen, 11  
   Creede district: Emmons (W H), 13d  
   Custer Co.: Emmons (S F), 96a  
   Fall River district, Alice mine: Herrick (R L), 09  
   geologic distribution: Rickard, 10  
   Georgetown quadrangle: Spurr, 08  
   Gunnison Co.: Hill (J M), 09  
   Idaho Springs district: Spurr, 06c  
   Lake City district: Irving, 11a  
   Lake Fork district: Woolsey, 07  
   Leadville: Argall, 10; Butler (G M), 12b; Carlyle, 93; Emmons (S F), 86; Yankee Hill: Shedd, 81  
   McClellan Mountain: Berthoud, 76  
   Monarch district: Crawford (R D), 10; and Tomichi district: Crawford (R D), 13  
   Montezuma district, Summit Co.: Patton, 09; Ritter, 03a; Van Horn (F R), 08a  
   Mosquito district, London mine: Moore (C J), 13  
   Ouray district: Cross, 07a; Ransome, 01b  
   Rico Mountains: Ransome, 01  
   Rosita region: Wulsten, 76  
   Silver Lake basin: Prosser (W C), 14  
   Telluride quadrangle: Purington, 98  
 Silver Cliff: Emmons (S F), 97b; Grabill, 82; Wallace (S J), 80  
 Silver Lake basin: Prosser (W C), 14  
 Silverton quadrangle: Ransome, 01a, 05; fissure systems: Ransome, 00b  
 Slate: Bailar, 08  
 Southern Colo.: Stevenson, 81  
 South Park region: Peale, 74a  
 Southwestern Colo.: Comstock, 86c, 87  
 Spanish Peake quadrangle: Hills, 01  
 Sulphur deposits, Mineral Co.: Larsen, 13b  
 Summit district, Rio Grande Co.: Hills, 85  
 Taylor Peak and Whitepine iron deposits: Harder, 09  
 Telluride district, San Miguel Co.: Porter (J A), 97; Purington, 97; Van Diest, 86; Winslow, 00; Wolf, 18a  
 Telluride quadrangle: Cross, 99; Lay, 02; Purington, 98, 99  
 Telluride veins, Lake Plata Mountains: Austin, 98a, 02  
 Tellurium ores: Hill (N P), 73; Silliman (jr), 74  
 Tenmile quadrangle: Emmons (S F), 98



## Colorado—Continued.

*Economic geology—Continued.*

- Tomichi district, Gunnison Co.: Dick, 18  
 Treasure Mountain: Purington, 08  
 Trinidad district: Whiteside, 12  
 Tungsten: Ekeley, 09; Fleck, 16; Hills (V G), 09; Van Wagenen, 06; Walker (T L), 09  
 Boulder Co.: George (R D), 09, 09b; Greenawalt, 07, 12; Kirk, 16; Leslie, 16; Lindgren, 07b; Palmer (L A), 13; Wolf, 16; Wood (J R), 10  
 San Juan Co.: Cooper (C A), 99; Prosser (W C), 10  
 Turkey Creek district, El Paso Co.: Stone (G H), 93c  
 Twin Lakes region: Guentherodt, 96  
 UnawEEP copper district, Mesa Co.: Butler (B S), 14b  
 Uraninite: Pearce, 16  
 Uranium: Fleck, 07, 09a, 16; Hillebrand, 00c, 05  
 Uranium-vanadium ores, origin: Notestein, 18  
 Vanadium: Fleck, 07, 09a, 16; Hillebrand, 00c  
 Placerville: Fleck, 08; Hess, 13b  
 southwestern Colo.: Thomas (K), 12  
 Telluride: Zalinski, 08  
 Vein intersections, Clear Creek Co.: Underhill, 97  
 Vein structure, Enterprise mine, Rico district: Rickard, 98a  
 Victor: Colburn, 04  
 Wagon Wheel Gap, mineral deposits: Emmons (W H), 13e  
 Walsenburg quadrangle: Hills, 00  
 Whale lode, Park Co.: Jernegan, 75  
 White River district: Endlich, 78  
 Whopper lode, Gunnison Co.: Frazier, 81a  
 Wolframite and scheelite, Leadville: Fitch, 16  
 Zinc, Aspen: Spurr, 09a  
 Leadville: Argall, 10; Butler (G M), 12b, 13; Loughlin, 18  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Montezuma district, Summit Co.: Patton, 09; Ritter, 08a  
 Rico district: Ritter, 13
- Historical geology.*  
 Alma district, Park Co.: Patton, 12  
 Animas River: Hawn (L), 74  
 Anthracite-Crested Butte quadrangles: Eldridge, 94; igneous formations: Cross, 94a  
 Apishapa quadrangle: Stose, 12  
 Arapahoe formation: Davis (W M), 00a  
 Archean-Cambrian contact, Manitou: Crosby, 99b  
 Arkansas Valley: Darton, 06f; Gilbert, 96a  
 Aspen district: Emmons, 88c; Newberry, 90; Sivy, 88; Spurr, 98  
 Aspen Mountain, Pitkin Co.: Brunton, 88; Henrich, 89  
 Atlantosaurus beds: Hatcher, 03  
 Atlas: Hayden, 77c  
 Barela Mesa coal field: McLaughlin, 03  
 Bonanza district, Saguache Co.: Patton, 16  
 Book Cliffs coal fields: Forrester, 18; Richardson (G B), 09b  
 Boulder Co.: Farish, 91; Van Diest, 87; Sugarloaf district: Crawford (R D), 09

## Colorado—Continued.

*Historical geology—Continued.*

- Boulder district: Fenneman, 05b; Henderson (J), 04  
 Breckenridge district: Ransome, 11  
 Brush Creek region: George, 13a  
 Buffalo Peaks, Mosquito Range: Emmons (S F), 83  
 Canon City: Clark (R N), 73; Hatcher, 01d; coal field: Stevenson, 82; Washburne, 10a  
 Carboniferous: Girty, 03; Sangre de Cristo Range: Lee (W T), 02a  
 Castle Rock quadrangle: Richardson (G B), 15  
 Castle Rock region: Lee (W T), 02b  
 Central City quadrangle: Bastin, 17  
 Chalk, Smoky Hill: Conrad, 66a  
 Chart of Colorado formations: Underhill (J), 10  
 Clear Creek, lower: Underhill (J), 06  
 Coal Creek batholith, age: Schneider, 15  
 Colorado formation: Stanton, 93  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Comanche formation, southeastern Colo.: Darton, 05j  
 Creede district: Emmons (W H) 13d  
 Cretaceous, eastern Colo.: Collier, 66  
 northeastern Colo.: Heroy, 15  
 Rocky Mountain region: Lee (W T), 15a  
 southwestern Colo.: Spencer (A C), 98  
 Cretaceous classifications: Carstarphen, 11  
 Cripple Creek district: Argall, 08; Cross, 95, 95c, 98a; Hazelhurst, 00; Lakes, 95a; Lindgren, 06d; McCarn, 94; Ritter, 05; Stevens (E A), 01; Stone (G H), 97  
 Denver Basin: Cross, 84, 85b; Cannon, 95b; Eldridge, 89, 90; Emmons (S F), 96; Lakes, 05c  
 Quaternary: Cannon, 89  
 Tertiary formation: Cross, 89  
 Denver formation: Cross, 89, 89a; Davis (W M), 00a; age: Cope, 89n; origin: Davis (W M), 97a  
 Devonian, southwestern Colo.: Spencer (A C), 98a, 00  
 Dinosaur beds: Williston, 78; Grand River valley: Riggs, 01, 02  
 Eagle, Grand, and Gunnison valleys: Peale 76  
 Eastern Colo.: Butler (G M), 15; Cannon, 90a; Van Diest, 90  
 Elbert formation, Devonian: Cross, 04a  
 Elk Mountains: Emmons (S F), 94; Holmes (W H), 76  
 Elmore quadrangle: Hills, 99  
 Engineer Mountain quadrangle: Cross, 10  
 Erupted rocks: Endlich, 78b  
 Eruptive mountains: Peale, 77a  
 Florence oil field: Eldridge, 92  
 Florissant lake beds: Cockerell, 16e; Henderson (J), 06; Knowlton, 16b; Scudder, 81; Wheeler (W M), 08  
 Flow breccias: Patton, 15c  
 Fluidal gneiss and contemporary pegmatites: Cross, 09a  
 Foothills formations of north central Colorado: Henderson (J), 09  
 Foothills structure, northern Colo.: Ziegler, 17c  
 Fort Pierre, Boulder: Stanton, 88  
 Fossil Ridge sandstone: Henderson (J), 08a



## Colorado—Continued.

*Historical geology*—Continued.

- Fox Hills formation: Stanton, 15b  
 Fox Hills group: Stevenson, 79a  
 Fox Hills sandstone: Knowlton, 16  
 Fremont Co.: Williams (S G), 76  
 Front Range: Hallowell, 82a; Hayden, 76; foothills, structure: Richardson (G B), 12a  
 Garnetiferous bed, Golden Gate Canyon, Jefferson Co.: Bailey (E W), 05  
 General: Berthoud, 81; Darton, 18a; Denton 66, 67; Girty, 03; Hague, 77; Hayden, 69, 71, 74, 76; Henderson (J), 14; Hills, 89b; King (C), 78a; Lakes, 88, 89; Loew, 75; Ziegler, 18b  
 Geologic map: George (R D), 13b; U S G S Terr, 78  
 Georgetown quadrangle: Ball (S H), 08; pre-Cambrian rocks: Ball (S H), 06  
 Gilpin Co.: Bastin, 17  
 Gleneyrie formation: Finlay, 07a  
 Gold Brick district, Gunnison Co.: Crawford, 16  
 Golden region: Berthoud, 75; sections: Ehnborn, 16  
 Gold Hill mining region: Marvine, 74a  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand Mesa coal field: Lee (W T), 09d  
 Grand River district: Peale, 77, 78  
 Grayback district, Costilla Co.: Patton, 10a  
 Greenhorn Mountain: Van Diest, 02  
 Green River formation: Winchester, 18b  
 Grizzly Peak breccias: Stone (G H), 99a  
 Gunnison City: Lakes, 97  
 Gunnison Co.: Hill (J M), 09; Tertiary coal measures: Hallowell, 83a  
 Gunnison district: F., 80  
 Gunnison Valley, coal resources: Woodruff, 12b  
 Hahns Peak region, Routt Co.: Gale, 06; George (R D), 09c  
 Huerfano Basin: Hills, 02a; Osborn, 97, 97b, i  
 Huerfano beds: Hills, 90a, 95  
 Jura-Trias, southwestern Colo.: Hills, 82  
 Laccolites, southeastern Colo.: Gilbert, 96b, d  
 Lake City district: Cross, 11; Irving, 11a  
 La Plata Co. coal field: Clayton, 78  
 La Plata quadrangle: Cross, 99a  
 Laramie group: Stevenson, 79b  
 Las Animas district: Hawn (F), 74  
 Leadville, Lake Co.: Carlyle, 93; Emmons (S F), 82; Ricketts, 83; Storms, 99d; Van Wagenen, 82  
 Lignites, age: Stevenson, 74  
 Lignitic group: Hayden, 76a  
 Mesozoic: Stevenson, 89  
 Middle Park region: Marvine, 74; post-Laramie beds: Cross, 95a  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Monarch district, Chaffee Co.: Crawford (R D), 10  
 Monument Creek formation, age: Darton, 05i  
 Monument Creek group: Richardson (G B), 12  
 Morrison and Sundance formations, relation: Lee (W T), 17d  
 Morrison beds: Stanton, 05b

## Colorado—Continued.

*Historical geology*—Continued.

- Morrison formation: Henning, 09; Lee (W T), 01, 02; Mook, 16; age: Schuchert, 18a  
 Mosquito Range: Emmons (S F), 86  
 Mount Wilson district: Nason, 00  
 Needle Mountains quadrangle: Cross, 05b  
 Nepesta quadrangle: Fisher (C A), 06a  
 Northern Colo.: Cope, 74a; Ziegler, 17b  
 North Park: Beekly, 15; Broadhead, 82d; Finlay (G I), 17  
 Northwestern Colo.: White (C A), 78d, 89  
 Oil fields: Lakes, 01  
 Ordovician rocks: Darton, 06b  
 Ouray district: Howe, 05; Purington, 03a  
 Ouray limestone: Girty, 00  
 Ouray quadrangle: Cross, 07a  
 Palmer Lake: Cannon, 95a  
 Perry Park: Cannon, 91a; syncline: Kruger, 10  
 Permian, foothills: Butters, 13  
 Pikes Peak sheet: Cross, 94  
 Platoro-Summitville district: Patton, 18  
 Post-Laramie deposits: Cross, 92  
 Pre-Cambrian, Georgetown quadrangle: Ball (S H), 06  
 Providence district, Boulder Co.: Van Diest, 95a  
 Pueblo quadrangle: Gilbert, 97  
 Rabbit Ears region: Grout, 13a  
 Rangely oil district, Rio Blanco Co.: Gale, 08b  
 Raton Mesa region: Knowlton, 13; Lee (W T), 11, 13b, 17  
 Red beds: Henderson, 08; Henning, 13; southwestern Colo.: Cross, 05c  
 Red Cliff region, Colo.: Means, 15  
 Red Mountain district, Ouray Co.: Kedzie, 88  
 Rico district: Rickard, 97, 98a; Newman Hill: Farish, 92  
 Rico Mountains: Cross, 00; Ransome, 01  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain front range: Darton, 04c  
 Rocky Mountain National Park: Lee (W T), 17a  
 Rocky Mountain region, Paleozoic: Tomlinson, 17  
 Rocky Mountains: Hills, 91c; age: Peale, 77b  
 Rosita Hills, Custer Co.: Cross, 91, 91b, 96  
 Routt Co.: Fenneman, 06b  
 Salida region: Cross, 95b  
 Sangre de Cristo Range, Costillo Co.: Van Diest, 98  
 San Juan Co.: Comstock, 83  
 San Juan region: Comstock, 86b; Endlich, 75, 76  
 San Luis district: Endlich, 74  
 San Luis Valley: Siebenthal, 10  
 San Miguel: Hills, 80  
 San Miguel formation: Cross, 98b  
 San Miguel Mountains: Holmes (W H), 78  
 Scranton coal, Denver Basin: Richardson (G B), 17  
 Sierra Abajo: Holmes (W H), 78  
 Silver Cliff: Cross, 96; Wallace (S J), 80  
 Silverton quadrangle: Cross, 01, 05  
 Southern Colo.: Endlich, 77; Lesquereux, 73; Stevenson, 75, 79, 81  
 South Park region: Peale, 74  
 Southwestern Colo.: Comstock, 87; Cross, 14a  
 Spanish Peaks: Savage, 85



## Colorado—Continued.

*Historical geology—Continued.*

- Spanish Peaks quadrangle: Hills, 01  
 Steamboat Springs: Witter, 99  
 Sugarloaf district, Boulder Co.: Crawford (R D), 09  
 Table of formations: Underhill (J), 05  
 Telluride district, San Miguel Co.: Purington, 97; Van Diest, 86  
 Telluride quadrangle: Cross, 99  
 Tenmile quadrangle: Emmons (S F), 98  
 Tiffany beds: Granger, 17  
 Tertiary: Lesquereux, 74b; Denver: Cross, 89a; Huerfano River: Hills, 89a  
 Triassic portion of the Shinarump group: Cross, 08  
 Trinidad coal field: Lakes, 86; Richardson (G B), 10  
 Uinta Basin: Eldridge, 96  
 Ute country: Hawn (F), 74  
 Ute Pass region: Crosby, 97e  
 Walsenburg quadrangle: Hills, 00  
 Western Colo.: Cross, 07  
 White River district: Endlich, 78  
 White River formation: Marsh, 70b  
 Yampa River region: Hancock, 15

*Mineralogy.*

- Acanthite, Rico: Chester (A H), 94b  
 Alaskaite: Koenig, 88b  
 Allanite, Douglas Co.: Eakins, 86a  
 Alunite, Ouray Co.: Hurlbut, 94  
 Amazon stone, Pikes Peak: Rath, 76b  
 Analcite, Golden: Klein, 84  
 Apophyllite, Golden: Klein, 84  
 Aquamarine beryls, Mount Antero, Chaffee Co.: Cross (R T), 87  
 Aragonite, Fort Collins: Rath, 85f  
 Astrophyllite, Pikes Peak region: Eakins, 91  
 Bald Mountain, minerals with uranium ore: Becke, 09  
 Barite, Aspen: Kemp, 89a  
 Bastnäs site: Allen, 80  
 Beegerite, Park Co.: Koenig, 81e; San Juan Co.: Koenig, 85a  
 Bertrandite, Mount Antero: Penfield, 88, 89b  
 Beryllium minerals, Mount Antero: Penfield, 90d  
 Beryls, Mount Antero: Hills, 90  
 Breckenridge district: Ransome, 11  
 Calamine, Leadville: Paul, 12  
 Calaverite, Cripple Creek: Hillebrand, 95, 95a; Knight (F C), 98; Smith (G F H), 02  
 Calcium vanadates: Hillebrand, 13b  
 Cancrinite, sulphatic: Larsen, 16a  
 Carnotite: Hillebrand, 05; Henning, 08  
 Montrose Co.: Cumenge, 99; Friedel, 99  
 San Miguel Co.: Hillebrand, 00c  
 Catalog: Endlich, 78a; Smith (J A), 70, 81, 83  
 Cebollite, Gunnison Co.: Larsen, 14b  
 Chalcedony and opal: Patton, 98  
 Chalcophanite, Leadville: Ford (W E), 14a  
 Columbite, Jefferson Co.: Headden, 86  
 Covellite, Cashin mine: Rogers (A F), 11  
 Cosalite, alaskaite, and beegerite: Koenig, 85  
 Copper minerals, Alaska lode, southwestern Colo.: Liweh, 85

## Colorado—Continued.

*Mineralogy—Continued.*

- Cripple Creek district: Lindgren, 06d  
 Cryolite minerals: Cross, 83b  
 Crystal beds, Topaz Butte: Smith (W B), 87  
 Dechenite, Leadville: Iles, 82a  
 Diaspore, Rosita Hills: Melville, 91b  
 Douglas Co.: Hillebrand, 89  
 El Paso Co.: Koenig, 77, 77a  
 Emmons site: Hillebrand, 04, 05a  
 Empressite, Kerber Creek district: Bradley (W M), 14, 15  
 Enargite, covellite, and pyrite, Ouray Co.: Thornton, 10  
 Enargite, Summit district: Pirsson, 94  
 Feldspar, Cripple Creek: Warren (C H), 01  
 Ferberite: Hess, 14  
 Gadolinite, Douglas Co.: Eakins, 86a  
 Garnets, pseudomorphs, Salida: Penfield, 86b  
 General: Endlich, 74; George (R D), 13; Loew, 75a; Pearce, 86; Randall, 86; Smith (J A), 67  
 Gilpinite, Gilpin Co.: Larsen, 17j  
 Goldschmidtite, Cripple Creek district: Hobbs, 99  
 Gütermanite, San Juan Co.: Hillebrand, 85a  
 Gunnison Co.: Larsen, 14a  
 Gunnisonite: Clarke (F W), 82  
 Halloysite, Wagon Wheel Gap: Larsen, 17b  
 Halotrichite, Pitkin Co.: Bailey (E H S), 90a, 91  
 Hetaerolite, Leadville: Argall, 14; Ford (W E), 13a  
 Hinsdalite: Larsen, 11a; and natramblygonite: Schaller, 12  
 Hydrophane: Church, 89  
 Jarosite, Chaffee Co.: Koenig, 80, 81b  
 Kaolinite, Red Mountain: Hills 84a  
 Kaolinite from Silverton: Mileh, 08  
 Kobellite, Ouray: Keller, 89  
 Krennerite, Cripple Creek: Chester (A H), 98  
 Lake City district: Irving, 11a  
 Leadville, tellurium and bismuth: Pearce, 91; zinc-ore minerals: Loughlin, 18  
 Leverrierite, Saguache Co.: Larsen, 17c  
 List: Cross, 85e  
 Löllingite: Hillebrand, 84; variety, Gunnison Co.: Hillebrand, 84  
 Metahewettite: Hillebrand, 14  
 Meteorite, Bear Creek: Smith (J L), 67  
 Bear River: Jackson, 61  
 Bishop Canyon, San Miguel Co.: Farrington, 14  
 Currant Creek: Headden, 08  
 Franceville: Preston (H L), 02a  
 Guffey: Hovey, 09e  
 Russel Gulch: Smith (J L), 66a, 67  
 Sierra Madre Range: Shepard, 66b  
 Minium, Leadville: Hawkins (J D), 90  
 Molybdite: Schaller, 08  
 Monarch district, Chaffee Co.: Crawford (R D), 10  
 Mount Antero: Kunz, 88e  
 Muthmannite: Schaller, 14a  
 Natramblygonite: Schaller, 11a  
 Nevadite, Chalk Mountain: Cross, 84a  
 North Table Mountain: Wilson (E H), 17



## Colorado—Continued.

*Mineralogy—Continued.*

- Phenacite, Topaz Butte: Penfield, 87  
 Phosphorescent calcites: Headden, 06a  
 Pickeringite: Goldsmith, 77a  
 Pike's Peak: Cross, 82a  
 Polybasite, Aspen: Penfield, 92a  
 Proustite and argentite near Montezuma: Van Horn (F R), 08, 08a  
 Ptilolite, Custer Co.: Clarke (F W), 92a; Cross, 92a; Jefferson Co.: Cross, 86b  
 Pyrite: Ayres, 89; Kraus, 06d  
 Gilpin Co.: Ungemach, 16  
 Ibex mines: Kunz, 17  
 Spanish Peaks: Zimányi, 12  
 Radioactive minerals and springs: Wolcott, 04  
 Rare mineral occurrences: Hills (R C), 17  
 Rhodochrosite, Lake Co.: Kunz, 87e; Wherry, 17b  
 Rickardite, Vulcan: Ford, 03  
 Siderophyllite, Pike's Peak: Lewis, 80b  
 Smaltite, Gunnison Co.: Iles, 82  
 Spessartite, Chaffee Co.: Kunz, 86e  
 Southern Colo.: Endlich, 77  
 Staffelite, Pike's Peak: Goldsmith, 78a  
 Sulphantimonites: Eakins, 88  
 Sundry minerals: Headden, 05a; Koenig, 78c; Smith (W B), 88  
 Telluride (calaverite), Cripple Creek: Duce, 17a  
 Telluride of gold and silver, Boulder Co.: Eilers, 73a  
 Telluride ore, Sierra Blanca: Pearce, 98i  
 Tellurides: Palache, 00  
 Tellurium: Headden, 03a; associated with silver and gold, Clear Creek Co.: Pearce, 98d  
 Tennantite, Aspen: Penfield, 92a  
 Tetradymite: Hillebrand, 05a  
 Thuringite: Larsen, 17a  
 Topaz, Chaffee Co.: Kunz, 86e; and garnet in lithophyses of rhyolite: Cross, 86a  
 Tourmaline, Belcher Hill: Patton, 99  
 Tungsten minerals, Boulder Co.: George (R D), 09  
 Tysonite: Allen, 80  
 Uraninite: Pearce, 98c, 16  
 Vanadium, Leadville: Iles, 82a  
 Von diestite, San Luis: Cumenge, 99  
 Wagon Wheel Gap: Larsen, 16  
 Willemite, Salida: Penfield, 94b  
 Wolframite and scheelite, Leadville: Fitch, 16  
 Xenotime, El Paso Co.: Penfield, 93a  
 Zeolites, Golden: Patton, 00; Cross, 82  
 Zunyite, Ouray Co.: Penfield, 93a; San Juan Co.: Hillebrand, 85a

*Paleontology.*

- Algae of petroleum-yielding shales of Green River formation: Davis (C A), 16  
 Allosaurus fragilis: Gilmore, 15a  
 Amber in Laramie: Cockerell, 09m  
 Amphicoelias, Canon City: Cope, 78za; Dakota group: Cope, 77n  
 Anchisodon, White River Beds: Cope, 79h  
 Animasaurus carinatus: Case, 12a  
 Anthozoa, Cretaceous: White (C A), 79b  
 Ants, South Park: Scudder, 77d  
 Artiodactyla, selenodont, Uinta beds: Scott, 99

## Colorado—Continued.

*Paleontology—Continued.*

- Ballostoma, Florissant: Scudder, 85e  
 Boulder area: Henderson (J), 04  
 Brachiosaurus: Riggs, 03a  
 Bunaelurus, East Pawnee Butte: Matthew (W D), 02b  
 Camaeosaurus supremus: Cope, 77v  
 Camarasaurus: Cope, 77m; Mook, 14a  
 Canidae, Miocene: Matthew (W D), 02c  
 Carboniferous: Girty, 03; Gurley (W F E), 83, 84  
 Ceratodus, Jurassic: Marsh, 78  
 Cladodus, Devonian: Hay (O P), 02b  
 Cockroaches, Triassic, Fairplay: Scudder, 85g, h, 86c  
 Colorado formation, fauna: Stanton, 93  
 Cretaceous invertebrates: Henderson (J), 08b; Meek, 71; White (C A), 81e, 82a  
 Cretaceous plants, southwestern Colo.: Cockerell, 16a  
 Crow Creek: White (C A), 79d  
 Denver Basin, plants: Knowlton, 96; vertebrates: Marsh, 96a  
 Denver Tertiary formation: Cross, 89  
 Devonian fauna of the Ouray limestone: Kindle, 09  
 Dinosauria: Gilmore, 14; Owen (R), 78  
 Dakota beds: Cope, 77b  
 Denver beds: Cannon, 89a  
 Jurassic: Marsh, 77f  
 Tertiary: Lee (W T), 13b  
 Dipterus remains, Devonian: Eastman, 15  
 Elephant, Fort Lyon: Woodhull, 72; Golden: Rockwell, 72  
 Eocene insects: Cockerell, 08u, 09f  
 Epanterias amplexus, Canon City: Cope, 78x  
 Euphorbiaceae: Cockerell, 09l  
 Fagaceae: Hollick, 09  
 Ferns, Laramie beds: Hollick, 02a  
 Fish remains, Canon City: Clarke (J M), 95a; Vaillant, 02; Walcott, 91d  
 Devonian: Eastman, 04  
 Ordovician: A., 91  
 Tertiary, South Park: Cope, 75a  
 Florissant fossils: Bather, 09; Brues, 06; Cockerell, 06, 06a-h, 07b, 12, 13b, 16e; Scudder, 81, 92; Wheeler (W M), 06  
 Antholithes: Cockerell, 15c  
 Anthomyid fly: Cockerell, 13a  
 Aphididae: Cockerell, 08k  
 Asilid fly: Cockerell, 13i  
 Bee, leaf-cutting: Cockerell, 08d  
 Bird remains: Shufeldt, 13e, 17b; passerine bird: Allen (J A), 78  
 Bombyliidae: Cockerell, 14a  
 butterflies: Scudder, 89a  
 Cercopidae: Cockerell, 08b  
 Ceropalidae: Rohwer, 09c  
 Chrysopidae: Cockerell, 08e  
 Cicada: Cockerell, 06f  
 Coleoptera: Cockerell, 18; Scudder, 93, 00; Wickham, 09, 10, 11, 12, 12a, 13, 13a, 14, 16a, 17a  
 Crabronidae: Cockerell, 10c  
 Crustacean: Cockerell, 10b  
 Diptera: Cockerell, 08f, 09a, 14e, 17c  
 Dragon-fly: Cockerell, 08r



## Colorado—Continued.

*Paleontology—Continued.*

- Florissant fossils: Elateridae: Wickham, 08, 16  
 Equisetum: Cockerell, 15d  
 expedition for fossil insects: Wheeler (W M),  
 08; of 1908: Cockerell, 08m  
 Fig: Cockerell, 10g  
 Flower: Hollick, 07  
 Flowers and fruits: Cockerell, 11e  
 Fungus-gnat: Cockerell, 15e  
 Grass: Brues, 08b  
 Insecta: Cockerell, 06e, 07a, c-j, 08a, n, s, t,  
 09a-h, 10b, 11, 11a, 13d, e, j, 14f, 15b, 17, 17a;  
 Kirkaldy, 10; Rohwer, 09, 09a; Wick-  
 ham, 09  
 Isoptera: Cockerell, 13  
 Magnolia: Cockerell, 10e  
 Mantis: Cockerell, 08h  
 Mollusca: Cockerell, 06g, 07k  
 Mydaid fly: Cockerell, 13h  
 Nemestrinidae: Cockerell, 08s, t  
 Neuroptera: Scudder, 82f  
 Odonata: Calvert, 13  
 Orthoptera: Cockerell, 08i, 14c  
 Osmylidae (Neuroptera): Cockerell, 08g  
 Phoridae: Brues, 08a  
 Phryganea: Cockerell, 13f  
 Plagiopodopsis: Britton (E G), 15  
 Planocephalus: Bertkau, 85; Canu, 86  
 Planorbis: Cockerell, 06c  
 Plants: Cockerell, 06d, 08j, o, 09n; Heilprin,  
 96a; Kirchner, 98; Knowlton, 16b  
 Raphidia: Cockerell, 12c  
 Sambucus: Cockerell, 10f  
 Saw-flies: Cockerell, 06h, 08, 14d  
 Sequoia: Cockerell, 07m; Warder, 83  
 Smilax: Cockerell, 14g  
 Tenthredinoidea: Rohwer, 08a, b  
 Termitina: Scudder, 84b  
 Tipulidae: Scudder, 94  
 Tsetse fly: Cockerell, 09c, 16c  
 Wasp: Rohwer, 08, 09b; mellinoid: Rohwer,  
 08c  
 Water-bug: Cockerell, 06c  
 Zonitoid shell: Cockerell, 07k  
 Footprints, St. Vrain Creek: Parker (H W), 85  
 Fort Pierre, Boulder: Stanton, 88  
 Fossil flowers and fruits: Cockerell, 11a, e  
 Fossil Ridge fauna: Henderson (J), 08a  
 Fox Hills flora: Knowlton, 16  
 General: Henderson (J), 14; White (C A), 79d  
 Goat-antelope, Pikes Peak region: Cragin, 00  
 Goniopholis, Jurassic: Cope, 88r  
 Ground-sloth: Cockerell, 09  
 Haplocanthosaurus, Canon City: Hatcher, 03  
 Haplocanthus, Canon City: Hatcher, 03f  
 Huerfano lake basin: Osborn, 97  
 Hypisodus: Matthew (W D), 02e  
 Hypsirophus discurus: Cope, 78r  
 Insecta: Cockerell, 16; Scudder, 77, 92  
 Green River, Tertiary: Scudder, 67c  
 Triassic, Fairplay: Scudder, 84c, 90e  
 Invertebrata: Meek, 70d, 75; Laramie: White  
 (C A), 78; northwestern Colo.: Hender-  
 son (J), 10a  
 Liriodendron, Laramie group: Hollick, 94k  
 Llama remains: Cragin, 92

## Colorado—Continued.

*Paleontology—Continued.*

- Lykins fauna: Girty, 12  
 Mammalia: Matthew (W D), 01; Miocene:  
 Marsh, 73c  
 Marsupial, Miocene: Scott, 84  
 Mastodon bones: Emrich, 09  
 Megacerops: Leidy, 70a  
 Merycodus, Pawnee Creek beds: Matthew  
 (W D), 04  
 Mesa Verde Cretaceous plants: Cockerell, 10  
 Miocene species of Lymnaea: Cockerell, 08q  
 Miocene trees: Cockerell, 10a  
 Mollusca, Cretaceous: Conrad, 74; Laramie  
 group: White (C A), 83h  
 Montana flora: Knowlton, 00  
 Mosasaurid, Flagler: Lee (W T), 97  
 Mosses: Britton, 07  
 Nelumbo, Laramie beds, Florence: Hollick, 94b  
 Northeastern Colo.: Henderson (J), 07a  
 Ordovician (?) fish remains: Cockerell, 13c  
 Ordovician vertebrate fauna, Canon City:  
 Walcott, 92a  
 Ornithomimus, Denver group: Cannon, 91  
 Orthoptera, South Park: Scudder, 76  
 Ostracoda: Jones (T R), 86  
 Ouray fauna: Girty, 00  
 Parahippus, occurrence: Cockerell, 08p  
 Permian plants: Lesquereux, 82  
 Petropterion, Pierre formation: Cockerell, 12b  
 Physopoda: Scudder, 75a  
 Plant (Ficus) from the Fox Hills Cretaceous:  
 Cockerell, 07l  
 Plantae, Cretaceous and Tertiary: Lesquereux,  
 78b; Golden: Lesquereux, 88  
 Pleurotomaria: Meek, 74  
 Pliocene Vertebrata: Cope, 74a  
 Probaena, Jurassic: Hay (O P), 03b  
 Protolabis, Loup Fork beds: Cope, 76f  
 Radiolites austinensis, Denver: Cannon, 95  
 Reptilia: Leidy, 70b  
 Cretaceous: Cope, 78ze  
 Dakota beds: Cope, 78h, k  
 Morrison: Anon, 77a  
 San Juan Basin, Mammalia: Granger, 17  
 Saurians, Dakota formation: Cope, 78n, p  
 Sauropodan gastroliths: Cannon, 06a  
 Scutellaster: Cragin, 95  
 Silicified wood, Colorado City: Nicholson, 73e,  
 75d  
 Stegosaurus, Golden: Cannon, 90  
 Symborodon, Miocene: Cope, 74j  
 Tertiary, dinosaurs: Lee (W T), 13b  
 fresh-water Mollusca: Hannibal, 12  
 fungus gnat: Johannsen (O A), 12  
 Insecta: Scudder, 78  
 leaf-cutting bee: Cockerell, 10d  
 plants: Cockerell, 08j; Lesquereux, 74b  
 Testudo, Miocene: Hay (O P), 04d  
 Tiffany beds fauna: Matthew (W D), 18h  
 Tillodont skull, Huerfano Basin: Granger, 18  
 Titanosaurus: Marsh, 77b  
 Titanotheres, Oligocene: Osborn, 16; Uinta  
 beds: Douglass, 10  
 Tortoise, Miocene: Hay (O P), 05h, 10c  
 Triassic and Jurassic, San Miguel: Hills, 80  
 Trichocnemis: Muttkowski, 10



## Colorado—Continued.

*Paleontology*—Continued.

- Vermejo and Raton floras: Knowlton, 17  
 Vertebrata: Cope, 74  
   Denver region: Cannon, 06  
   Miocene: Cope, 74h  
   Tertiary: Cope, 73a  
 Wading bird, Amyzon shales: Cope, 81a  
 Woods, fossil: Nicholson, 73e, 75d; Platen, 08  
 Zanycteris (Paleocene bat), Ignacio: Matthew (W D), 17a

*Petrology*.

- Alaskaite: Koenig, 81  
 Alum Hill, Boulder Co.: Andrews (C I), 98  
 Analcite basalt: Cross, 97a  
 Andesite, Conejos: Rath, 75; Mount Sugar Loaf, Boulder Co.: Hogarty, 02  
 Anthracite—Crested Butte quadrangle, igneous formations: Cross, 94a  
 Apishapa quadrangle: Cross, 12c, 14; Stose, 12  
 Basalt, Table Mountain: Cross, 82  
 Bonanza district, Saguache Co.: Patton, 16  
 Boulder Co., eruptive rocks: Palmer (C S), 90, 91; intrusive rocks: Crawford (R D), 09a; Sugarloaf district: Crawford (R D), 09  
 Breckenridge district: Ransome, 11  
 Buffalo Peaks, Mosquito Range: Cross, 83  
 Central City quadrangle: Bastin, 17  
 Clear Creek region: Underhill (J), 06  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Corundum and dumortierite in pegmatite: Finlay, 07  
 Cripple Creek district: Alling, 18; Cross, 95, 98a; Graton, 05b, 06; Lakes, 95a; Lindgren, 06d; breccias: Stone (G H), 98  
 Crystalline slates from Las Animas Canyon: Berg, 08  
 Denver Basin: Emmons (S F), 96  
 Dike, Ward district, Boulder Co.: Palmer (C S), 98  
 Diorite, Ophir Loop, Telluride quadrangle: Cross, 96a  
 Eocene formations, Rocky Mountains, petrographic characters: Johannsen, 14a  
 Erupted rocks: Endlich, 78b  
 Eruptive rocks, Custer Co.: Cross, 88c  
 Florissant, tufa: Wadsworth, 81  
 Flow breccias: Patton, 15c  
 General: Loew, 75; Zirkel, 77  
 Georgetown quadrangle: Ball (S H), 06, 08  
 Gilpin Co.: Bastin, 16, 17; Ritter, 08  
 Gold Brick district, Gunnison Co.: Crawford (R D), 16  
 Granites, Pikes Peak: Mathews, 95; West Sugarloaf, Boulder Co.: Henry, 03  
 Greenstone schists, San Juan Mountains: Howe, 04  
 Grizzly Peak breccias: Stone (G H), 99a  
 Hypersthene andesite, Buffalo Peaks: Cross, 83  
 Laccolite, southern Colo.: Gilbert, 96d  
 La Plata quadrangle: Cross, 99a  
 Leadville district: Cross, 86  
 Leadville porphyry: Emmons (S F), 83a; porphyry, so-called: Cope, 82a  
 Limburgite, Cripple Creek district; Stevens (E A), 01  
 Magnetite basalt, North Park: Washington, 13t

## Colorado—Continued.

*Petrology*—Continued.

- Mica-andesite, West Sugarloaf Mountain, Boulder Co.: Blake (J C), 01  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Needle Mountains quadrangle: Cross, 05b  
 Nevadite, Chalk Mountain: Cross, 84a  
 Olivinite dike, Magnolia district: Whitaker, 02  
 Phonolite, El Paso Co.: Cross, 88  
 Pike's Peak quadrangle, granitic rocks: Mathews, 00  
 Prowersose from Two Buttes: Cross, 06  
 Rabbit Ears region: Grout 13a  
 Replacement of rhyolite porphyry by stephanite and chalcopyrite at Leadville: Fenner, 10a  
 Rosita Hills: Cross, 91  
 Salida region: Cross, 95b  
 Schists, nodule-bearing, Pearl: Read, 03  
   Salida region: Cross, 95b  
 Silver Cliff and Rosita Hills: Cross, 96  
 Silverton quadrangle: Cross, 05; Van Horn (F R), 00  
 Southern Colo.: Conkling, 77a  
 Spanish Peaks region: Hills, 89, 90b  
 Spherulites: Cross, 91a  
 Sugarloaf district: Crawford (R D), 09  
 Sunset trachyte, Boulder Co.: Breed, 02  
 Telluride district: Cross, 98c, 99  
 Volcanic dust: Montgomery (H), 95
- Physical geology*.
- Anthracite-Crested Butte quadrangles: Eldridge, 94  
 Boulder district: Fenneman, 05b  
 Clastic dike, Ouray: Ransome, 00a, 01b  
 Cripple Creek, subterranean gases: Lindgren, 05k  
 Cripple Creek volcano: Rickard, 01  
 Denver region: Eldridge, 90  
 Erosion, canyon bottoms: Duce, 18  
   eastern Colo.: Hayden, 75  
   Mesa Verde: Haas, 17a  
 Erosion features, headwaters of Rio Grande: Patton, 98a  
 Erosion products: Endlich, 78c  
 Eruptive mountains: Peale, 77a  
 Fault and dikes, Ute Pass: Crosby, 97c  
 Faulting, Aspen district: Henrich, 89b  
   Dakota formation, Golden: Patton, 05  
 Fissures, Telluride district: Purington, 05b  
 Foothills structure, northern Colo.: Ziegler, 17b, c  
 General: Darton, 18a  
 Geyser basin, extinct, southwestern Colo.: Comstock, 86a  
 Glacial erosion, San Juan Mountains: Hopkins, 10b; Sawatch Range: Davis (W M), 04a  
 Glaciers, extinct and existing: Henderson (J), 10b; Rocky Mountains: Emmons (S F) 88b  
 Arapahoe Glacier: Lee (W T), 00a; 1902: Fenneman, 02b; 1903: Henderson (J), 04a; 1905: Henderson (J), 05a  
 Hallett's Glacier: Stone (G H), 87a  
 Las Animas Glacier: Stone (G H), 93a  
 Hot springs, origin of heat: Lakes, 05a



## Colorado—Continued.

*Physical geology—Continued.*

- Laccolites, southeastern Colo.: Gilbert, 96b, d  
 Laccolitic mountain groups: Cross, 94b  
 Landslides, Gunnison Co.: Cross, 86c  
   Rico Mountains: Cross, 00a  
   San Juan Mountains: Howe, 09  
   Telluride region: Cross, 96c  
 Leadville region: Bulkley, 85; Yankee Hill  
   fault: Shedd, 81  
 Middle Park region: Marvine, 74  
 Overtuns, Denver Basin: Henderson (J), 03  
 Plication, coal measures, southeastern Colo.:  
   Van Diest, 90a  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rock streams of Veta Mountain: Patton, 10  
 Rocky Mountains: Hills, 91c  
 Sandstone dikes, Ute Pass: Crosby, 95  
 Sandstone pinnacles: Darton, 12a  
 Silverton quadrangle: Cross, 05  
 Slumgullion mud flow: Cross, 09b  
 Southern Colo.: Stevenson, 75  
 Spanish Peaks region: Hills 89, 90b  
 Stylolites in quartzite, Breckenridge: Tarr  
   (W A), 16  
 Talus, San Juan Mountains: Spencer (A C), 00a  
 Telluride quadrangle: Lay, 02; Purington, 98  
 Tenmile quadrangle: Emmons (S F), 98  
 Upturning sedimentary rocks: Lee (W T), 08d  
 Veins, southwestern Colo.: Comstock, 86c  
 Volcanic eruptions, types of: Hills, 95a  
 Volcanoes, extinct: Lakes, 90  
 Wind erosion in the plateau country: Cross, 08a

*Physiographic geology.*

- Apishapa quadrangle: Stose, 12  
 Boulder district: Fenneman, 05b  
 Boulder mesas: Dodds, 08  
 Canyons, southeastern Colo.: Lee (W T), 02c  
 Castle Rock quadrangle: Richardson (G B), 15  
 Chalk Bluffs and Pawnee Buttes, topographic  
   development: Henderson (J), 07  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Débris-covered mesas, Boulder: Lee (W T), 00  
 Denver Basin: Eldridge, 89; Emmons (S F), 96  
 Eocene glaciation, Summitville quadrangle:  
   Atwood, 17  
 Estes Park, glacial moraines: Wooster, 18  
 Front Range of Rocky Mountains: Davis  
   (W M), 11; Hayden, 75a  
 Georgetown quadrangle: Ball (S H), 08  
 Glacial deposits, Eocene, southwestern Colo.:  
   Atwood, 15  
 Glacial epochs in San Juan Mountains: At-  
   wood, 12a  
 Glaciation, central Colo.: Hayden, 80a  
   Engineer Mountain quadrangle: Hole, 10  
   Leadville quadrangle: Capps, 09  
   Sangre de Cristo Range: Siebenthal, 07  
   San Juan Mountains: Atwood, 18; Hills, 84;  
   Howe, 06  
   Sawatch Range: Capps, 04; Davis (W M), 05  
   southern Colo.: Endlich, 77  
   Telluride quadrangle: Hole, 12a  
   Twin Lakes area: Westgate, 05  
 Glaciers, extinct: Henderson (J), 05  
 Gold Brick district, Gunnison Co.: Crawford, 16

## Colorado—Continued.

*Physiographic geology—Continued.*

- Golden district: Schneider, 13  
 Gunnison River, grand canyon: Atwood, 15b  
 Hanging valleys, Georgetown: Crosby, 03a  
 High Plains: Johnson (W D), 01  
 Mesa de Maya, physiographic significance:  
   Keyes, 07c  
 Mesa Verde: Atwood, 11b; Haas, 17a Newell, 98  
 Monarch and Tomichi districts: Crawford, 13  
 Moraines, Arkansas Valley: Hayden, 76  
   Mills moraine, Longs Peak region: Orton  
   (E, jr.), 09  
 Mosquito Range: Emmons (S F), 86  
 Northwestern Colo.: White (C A), 89  
 Pueblo quadrangle: Gilbert, 97  
 Rico Mountains: Cross, 00  
 River terraces, southwestern Colo.: Spencer  
   (A C), 00b  
 Rocky Mountain National Park: Lee (W T),  
   17a  
 Rocky Mountains: Hills, 91c  
 Sand dunes, San Luis Valley: Ingersoll, 75  
 San Juan district: Atwood, 11a; Holmes (W H),  
   77  
 San Juan Mountains: Atwood, 12a, 14a, 18;  
   Hopkins, 10b; geographic history: At-  
   wood, 16a  
 Sawatch Range: Capps, 04; Davis (W M),  
   04a, 05  
 Silverton quadrangle: Cross, 05  
 Southern Colo.: Stevenson, 75, 81  
 Telluride quadrangle: Cross, 99  
 Tepee buttes: Gilbert, 95a  
 Unaweep Canyon: Gannett, 82  
 Volcanic craters: Van Diest, 89  
 Yampa River, history: Hancock, 15

*Underground water.*

- Arkansas Valley: Darton, 06f; Gilbert, 96a  
 Artesian water: Berthoud, 81; Carpenter (L G),  
   90; Costilla Co.: Headden, 09  
 Denver Basin: Chisolm, 85; Cross, 84, 85b;  
   Slack, 87; Strong, 98; Van Diest, 90  
 Doughty Springs, Delta Co.: Headden, 05  
 Eastern Colo.: Van Diest, 90  
 Gunnison Co.: Hills, 87a  
 Hot springs, origin of heat: Lakes, 05a  
 Hot Springs, Wagon Wheel Gap: Emmons  
   (W H), 13e  
 Mineral springs: Headden, 09a; Manitou:  
   Shedd, 13  
 San Luis Valley: Headden, 17a; Siebenthal,  
   10, 10a  
 South Platte Valley, underflow: Slichter, 06a  
 Colorado Canyon: Davis (W M), 00b, 09a, b  
 Colorado Desert: Barrows, 00; Mendenhall, 09b, d  
 Colorado formation: Logan, 99a; Stanton, 93  
 Colorado Front Range: Davis (W M), 11  
 Colorado plateau province: Gilbert, 76a  
 Colorado plateaus: Powell, 80  
 Colorado River of Texas, geologic history: Hill  
   (R T), 89f  
 Colorado River of the West: Cadell, 87; Powell, 72,  
   73, 74, 75; consequent origin: Jefferson,  
   97  
 Colorado River region, Ariz.: Lee (W T), 06a  
 Colorado Springs, Colo.: Finlay (G I), 06



Colorado Springs coal field: Goldman, 10  
 Colorado Springs folio, Colo. (no. 203): Finlay (G I), 16  
 Coloration in fossils: Girty, 12a  
 Coloration of rocks: Wistar (I), 96  
 Colossal Cavern. *See* Caves.  
 Cols, formation: Hobbs, 10b  
 Columbia folio, Tenn. (no. 95): Hayes, 03  
 Columbia formation: Darton, 93c; McGee, 88, 88a, f, 91f, 93i, 94d; Salisbury, 94d; Illinois: Hershey, 95  
 Columbia lava: Russell, 97b  
 Columbia River gorge, geologic history: Williams (I A), 16a  
 Columbium: Baskerville, 08; James (C), 17a  
 Columbus esker: Morse, 07  
 Columbus folio, Ohio (no. 197): Hubbard (G D), 15  
 Columbus formation, Ohio: Swartz, 07a  
 Columbus quadrangle, Ohio: Stauffer, 11a  
 Columnar structure in limestone: Kindle, 14c  
 Comanche series: Hill (R T), 91, 95a; Kansas: Craigin, 95a  
 Combretanthites eocenica: Berry, 13  
 Commensalism, Platyceas, attachment to crinoids: Keyes, 89  
 Compass clinometer: Russell, 78c  
 Comptonia: Berry, 06f  
 Comstock, T. B., biography: Ries, 16  
 Comstock Lode, Nev.: Becker, 75, 80, 82, 82a; Church, 79, 79a; Rodgers, 11; Anon, 80; vein systems: Smith (D T), 12  
 Conard fissure, a Pleistocene bone deposit in Arkansas: Brown (B), 08  
 Concentration as a geological principle: Russell, 07a  
 Concentration of ores, natural: Lane 97  
 Concentration versus transportation: Shattuck, 09  
 Concrete materials.  
   Illinois, Chicago district: Burchard, 08a  
   Iowa: Beyer, 14  
 Concretions.  
   Barite, Nebraska: Burnett, 16  
   Calcareous concretions, Kettle Point, Lambton Co., Ont.: Daly 00  
   Canada: Weston, 92, 96  
   Clay concretions, Connecticut River: Arms, 91  
   Claystones, Hanover, N. H.: Edwards (A M), 71a; origin: Hayes (A A), 57  
   Clinton ores of Stone Valley, Pa.: Rutledge, 08  
   Connecticut Valley, Champlain clays: Sheldon, 00  
   Formation, Mexico: White (I C), 13  
   Formation of phosphatic concretions in deep-sea deposits: Davidson (W B M), 92a  
   General: Adams (C B), 47b; Gratacap, 84; Nichols (H W), 06; Todd, 03d  
   Geological effects: Todd, 03d  
   Growth of concretions: Hayes, 11b  
   Iron concretions, Redbank sands, New Jersey: Willcox, 06a  
   Kansas, Ottawa Co.: Bell (W T), 01  
   Log-like concretions, in Laramie formation: Todd, 96b  
   Massachusetts: Hitchcock (E), 41  
   Menilite, organic structure: Herrera, 16  
   Nebraska, Burnham, Dakota clays: Burnett, 16a; Pierre shale: Barbour (C A), 01  
   New forms: Nichols (H W), 06

## Concretions—Continued.

New York, Chemung: Kindle, 04b; Columbia Co.: Grant (W H), 51  
 Nova Scotia, Grand Lake, ferruginous concretions: Honeyman, 83c  
 Ohio, Greenfield limestone: Napper, 17  
 Oolitic and pisolitic barite, Saratoga oil field.  
   Texas: Moore (E S), 14a  
 Orbicular and concretionary structure, origin: Blake (W P), 05b  
 Origin: Kavanagh, 89; Moore (E S), 17; Nichols, 97; Roddy, 15  
 Physical origin of certain concretions: Gardner, 08  
 Quartz nodule with radiate structure: Davison (J M), 06  
 Redbank sands: Willcox, 06a  
 Sand concretions: Barbour, 01  
 Sand-calcite crystals: O'Harra, 10  
 Sandstone concretions, formation: Merrill (G P), 94a  
 Siliceous: Crosby, 88d  
 Siliceous oolites: Moore (E S), 12  
 Texas: Udden, 12d  
 Condon, Thomas, biography: Condon, 10; Meany, 06; Oreg Univ, 06; Washburne, 07  
 Condylarthra: Cope, 82f, 84u  
 Cone in cone: Broadhead, 07; Gresley, 94a; Keyes, 96o; Newberry, 85k; White (C A), 68f; Kansas: Harnley, 98; Pennsylvania, Devonian; Gresley, 94a  
 Conemaugh fauna, Ohio: Mark 12  
 Conemaugh formation, Ohio: Condit, 09, 12a  
 Conemaugh series, Pa.: Raymond (P E), 09a  
 Conglomerate series, W. Va.: Fontaine, 76  
 Conglomerates.  
   Cambrian conglomerate, Ripton, Vt.: Dale, 10a  
   Carboniferous, Rhode Island: Walcott, 98b  
   Cementing material: Hayes, 57a  
   Classification: Moody, 17  
   Clinton: Foerste, 95  
   Corrosion conglomerate: Sardeson, 14  
   Desiccation conglomerates: Hyde, 08  
   Dikes, southern Arizona: Campbell (M R), 04c  
   Dome structure in conglomerate: Arnold, 08a  
   Etching in interior: Fuller, 02b  
   Formation: Davis (W M), 00c; by a mineral-laden stream in California: Arnold, 08f  
   General: Hitchcock (E) 61d; Lawson, 13; Niles, 71b  
   In gneisses: Winchell (A), 89b; in New England gneisses: Hitchcock (C H), 89a  
   Intraformational conglomerate: Emerson (F V), 16; Sardeson, 14; Walcott, 96a; origin and classification: Field, 16; Paleozoic: Walcott, 94a  
   Intrusions, Navajo Reservation: Gregory (H E), 15b  
   Limestone breccias, origin: Campbell (M R), 08  
   Louisiana, Shreveport, intraformational conglomerate and breccia: Emerson (F V), 16  
   Marine and terrestrial distinguished: Barrell, 09  
   Massachusetts, Bellingham: Crosby, 80b; Roxbury: Mansfield, 06a; Sayles, 10  
   Metamorphosed pebbles: Niles, 72a  
   Nova Scotia, Carboniferous: Gilpin, 91



## Conglomerates—Continued.

- Ohio, Mississippian: Lamb, 14; Sharon: Lamb, 11  
 Ontario, Huronian rocks, Nipissing: Hore, 10a  
 Origin: Branner, 86a; Collie, 96; Hopkins (T C), 96d; Rogers (H D), 42a  
 Palcozoic, origin: Brown (E P), 13  
 Pottsville, origin: Branner, 86a  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 Types: Mansfield, 07  
 Utah, Paria River: Talmage, 00c

Congresses. *See* Associations.

Connate water in oil and gas sands: Johnson (R H), 15; Shaw (E W), 15a

## Connecticut.

- Ancient lavas: Pyncheon, 96  
 Bibliography: Gregory (H E), 07  
 Boulder, Woodbridge: Hubbard (O P), 87  
 General: Rice (W N), 04  
 Geography, geological structure and history: Rice (W N), 06  
 Litchfield: Brace, 20; Silliman, 20b  
 Manual of geology: Rice (W N), 06  
 Meriden area: Dana (J D), 70  
 New Haven: Silliman, 20b  
 New London Co.: Mather, 34  
 Salisbury: Lee (C A), 24a  
 Survey reports: Conn G S, 04; 1915-16: Gregory (H E), 17a  
 Wallingford: Davis (C H S), 70  
 West River Mountain: Gibbs, 14  
 Windham Co.: Mather, 34

*Economic geology.*

- Barite: Credner, 66a  
 Bristol area: Richardson (C S), 54d  
 Building stone: Hawes, 84; Hubbard (O P), 85  
 Cement materials: Eckel, 13  
 Clay: Loughlin, 05  
 Cobalt, Chatham: Richardson (C S), 54a  
 Copper: Hoffmann, 22; Weed, 11; Bristol: Richardson (C S), 54f; Silliman (jr), 55  
 Feldspar deposits: Bastin, 10; Watts (A S), 16  
 General: Shepard, 37  
 Granites: Dale, 11a; Kemp, 99c  
 Hydraulic limestone, Southington: Lowrey, 28  
 Iron: Putnam, 86; Pyncheon, 99  
   hematite, Litchfield: Eckel, 05c; western Connecticut: Eckel, 04i  
   Kent: Silliman, 20b  
   New Milford: Shepard, 31  
   Salisbury district: Hobbs, 07d  
 Limestone: Ries, 96  
 Marble: Seely, 85a; Silliman, 20b  
 Nickel, Chatham: Richardson (C S), 54a  
 Peat, New Haven: Davis (C A), 13  
 Sandstone, Portland: Johnson (J), 55  
 Tellurium: Silliman, 19a  
 Trap rock, Connecticut Valley: Ford (F L), 03  
 Tungsten: Silliman, 19a; Trumbull: Hobbs, 01a, 03b  
 Wolfram ore, Fairfield Co.: Gurlt, 94

*Historical geology.*

- Boring, New Haven: Hubbard (O P), 89  
 Southbury: Hovey, 90  
 Canaan: Dana (J D), 72g  
 Cedar Mountain trap ridge: Davis (W M), 18b

## Connecticut—Continued.

*Historical geology—Continued.*

- Central Conn.: Barrell, 12  
 Connecticut Valley: Hitchcock (E), 23; Lull 12b; Smith (A), 32  
 East-Haven-Branford region: Hovey, 89  
 General: Cleland, 12; Gregory (H E), 09a; Mather, 33; Percival, 42  
 Geologic map: Gregory (H E), 07a  
 Housatonic Valley: Crosby, 00b; Hobbs, 93a  
 Lighthouse granite: Ward (F), 04  
 Limestones, age: Dana (J D), 91b  
 Meriden area: Chapin, 91; Dana (J D), 70; Davis (W M), 96a; ash bed: Davis (W M), 89c; trap ridges: Chapin, 87, 88  
 Newark formation, Pomperaug Valley: Hobbs, 00b, 01  
 Newark red series: Schuchert, 08  
 New Haven region: Dana (J D), 71, 76, 91; Silliman, 10, 14a  
 New London Co.: Mather, 34  
 Norfolk: Dana (J D), 90d  
 Northwestern Conn.: Hobbs, 97  
 Ordovician, Green Mountain region: Dana (J D), 73a  
 Peat deposit, New Haven: Davis (C A), 13a  
 Preston region: Loughlin, 12  
 Quartzite, Green Mountains: Dana (J D), 72b  
 Sandstone, age: Agassiz (L), 50c; Jackson, 50h; Wells, 50; Connecticut Valley: Whitney, 60b  
 Section, Killingly to Haddam: Mather, 31  
 Taconic area: Walcott, 88  
 Taconic Range: Dana (J D), 84  
 Taconic schists, Hudson River age: Dana (J D), 79a  
 Taconic stratigraphy: Dana (J D), 85b  
 Tariffville region: Rice (W N), 86  
 Trap, New Haven region: Dana (J D), 91c, 92a  
 Trap and sandstones, relation, in Connecticut Valley: Whelpley, 45a  
 Trap belts: Dana (J D), 91d  
 Trap ridges, Connecticut Valley: Davis (W M), 83b  
 Trap-sandstone contact, Wallingford: Chapin, 34  
 Triassic, Connecticut Valley: Davis (W M), 86a, d, 88, 91e, 98; Emerson, 96a; Hitchcock (E), 47a; Newberry, 88; Pyncheon, 96, 05; Redfield, 51; Rice (W N), 06a; Russell, 78b; Silliman (jr), 44b  
   eastern boundary: Davis (W M), 94  
   fossiliferous shale: Davis (W M), 91  
   Meriden: Davis (W M), 89a  
   topographic development: Davis (W M), 89d  
   traps and sandstones: Davis (W M), 82b, 83, 89b  
 Windham Co.: Mather, 34

*Mineralogy.*

- Berlin: Percival, 22  
 Beryl, Haddam Neck: Martin (D S), 08  
 Biotite, lithia-bearing, Portland: Hawes, 76a  
 Bismutospaerite, Willimantic: Wells, 87  
 Bitumen, indurated, in trap of Connecticut Valley: Dana (J D), 78a  
 Branchville: Brush, 90  
 Chrysoberyl (cymophane): Haüy, 11



## Connecticut—Continued.

## Mineralogy—Continued.

- Columbite: Dana (J D), 37b  
Connecticut Valley: Hitchcock (E), 23  
Corundum, Barkhamsted: Emerson, 02a  
Cronstedtite, Trumbull Township: Hoadley, 18  
Cymophane: Häüy, 11  
Danburite: Dana (J D), 50d; Danbury: Shepard, 38d; Smith (J L), 53b, 56a  
Diabantite, Connecticut Valley: Hawes, 75b  
Edwardsite: Shepard, 37a  
Eremite: Shepard, 37b  
Fairfield Co.: Brush, 78b, 79, 79a  
Garnet, Barkhamsted: Emerson, 02a  
Garnets with trap, New Haven: Dana (E S), 77a  
General: Cochrane, 95; Hoadley, 17; Shepard 37  
Haddam: Webster, 20  
Haddam Neck: Bowman (H L), 02  
Hermannolite, Haddam: Shepard, 76  
Iolite: Shepard, 41a; Guilford: Farrington, 92  
Iron minerals, Salisbury: Brush, 67  
Litchfield Co.: Brace, 19  
Lithiophilite, Branchville: Penfield, 83, 95  
Meteorite, Weston: Silliman, 08, 09, 10a  
Mica, Branchville: Rath, 85f  
Mineral localities: Hitchcock (E), 28  
Monazite, South Lyme: Matthew (W D), 95b  
Orthoclase, South Lyme: Matthew (W D), 95b  
Phosphates, Fairfield Co.: Brush, 78, 78a  
Pseudomorphs, wolframite after scheelite, Trumbull: Warren (C H), 01  
Salisbury: Lee (C A), 24a  
Scovillite, Salisbury: Brush, 83; and rhabdophane, identity: Brush, 84  
Sillimanite, Saybrook: Bowen (G T), 24; and monazite: Silliman (jr), 44  
Spodumene, Branchville: Brush, 80a  
Sundry minerals: Rice (W N), 83  
Topaz: Shepard, 38c  
Tourmaline: Schaller, 12e  
Tremolite pseudomorphs: Hobbs, 92a  
Triphylite: Penfield, 95  
Washingtonite: Shepard, 42b

## Paleontology.

- Catopterus, Connecticut Valley: Davis (C H S), 87  
Connecticut Valley: Barbour, 89; Triassic: Lull, 07b, 12b  
Cycadinocarpus, Durham: Chapin, 91a  
Fishes, Connecticut Valley: Mather, 34a; Redfield, 37, 53  
Footprints, Connecticut Valley: Deane, 45a, b, 49; Hitchcock (E), 37, 44d, 45b, 47, 48, 66a; Warren (J C), 54  
Fossil bones, East Windsor: Wyman, 55  
Mastodon: Schuchert, 14c  
Berlin: Silliman, 34  
Farmington: Lull, 14c  
Ornithichnites: Deane, 43; Hitchcock (E), 36a; Rogers (H D), 41b; Wethersfield: Adams (C B), 46a  
Otozoum, Connecticut Valley: Hitchcock (E), 56c  
Plants, new red sandstone: Hitchcock (E), 43c  
Saurian: Marsh, 91d

## Connecticut—Continued.

## Paleontology—Continued.

- Stegomus, Connecticut Valley sandstone: Marsh, 96b  
Trees, Bristol: Silliman (jr), 47a  
Triassic: Lull, 15; Newberry, 87c; Rice (W N), 06a  
fishes: Eastman, 11; Durham: Newberry, 78c  
fishes and plants: Newberry, 88

## Petrology.

- Cordierite gneiss: Hovey, 88  
Cortlandt series: Hobbs, 06  
Diabase, Atlantic region, composition: Hawes, 82  
Diabase pitchstone and mud enclosures in Triassic trap: Emerson, 97  
Dike, acid, Triassic: Hovey, 97  
Dike, basic, Triassic: Griswold, 93  
Gabbros and associated rocks at Preston: Loughlin, 12  
Garnets with trap, New Haven: Dana (E S), 77a  
General: Cochrane, 95  
Granite: Kemp, 99c  
Granite-gneiss, central Connecticut: Westgate, 99  
Intrusive granites: Loughlin, 10a  
Lighthouse granite: Ward (F), 09  
Litchfield: Howe (E), 15, 15a  
Lithology: Barrell 10  
Newark system, Pomperaug Valley: Hobbs, 01  
New Haven area: Hawes, 86  
Quartz vein, Lantern Hill, Mystic: Kemp, 96e  
Talc, Canaan: Hobbs, 93c  
Trap ridges, East Haven-Branford region: Hovey, 89  
Trap rocks, Connecticut Valley: Dana (E S), 74; Frazer, 75j; Hawes, 75a

## Physical geology.

- Dikes, Triassic: Rogers (H D), 43e  
Earthquakes, 1840: Anon, 40a  
Faulting in crystalline rocks: Hobbs, 03d; Triassic, Meriden: Davis (W M), 89a  
Housatonic Valley: Hobbs, 93a  
Moving rocks, Salisbury: Lee (C A), 25  
Newark system, Pomperaug Valley: Hobbs, 01  
Peat deposit, New Haven: Davis (C A), 13  
Potholes, Gurleyville: Koons, 83  
Rain marks, Triassic: Redfield, 51a  
Structural features, western Conn.: Hobbs, 03a  
Volcanoes, extinct: Davis (W M), 91c

## Physiographic geology.

- Boulders: Dobson, 26  
Brewsters Neck: Gulliver, 06  
Cheshire "dam": Ward (F), 14  
Connecticut Valley: Dana (J D), 83b; Lull, 12b  
glacial deposits: Dana (J D), 81a  
glacial retreat: Dana (J D), 82  
Connecticut Valley glacier: Dana (J D), 71e  
Drainage: Hobbs, 01d  
Drift deposits: Dana (J D), 75e  
Eskers: Woodworth, 94c  
General: Burr, 04; Davis (W M), 96d; Küm-mel, 93  
Glacial geology: Gregory (H E), 06b  
Glacial terraces: Gulliver, 07a  
Glacial striae, Norfolk: Cornish, 90



**Connecticut—Continued.***Physiographic geology—Continued.*

- Glaciation: Pyncheon, 98  
 New Haven region: Blake (W P), 83d; Dana (J D), 71a, 83e  
 Pomperaug Valley Hobbs, 02b  
 southeastern Conn.: Wells, 90  
 Woodstock: Eggleston, 02  
 Gorges of the trap ridges: Emerson, 87a  
 Lowland: Burr, 04  
 Marine terraces, southeastern Conn.: Hatch, 17  
 Meriden area: Dana (J D), 70; Davis (W M), 89c, 95c  
 New Haven region: Dana (J D), 71  
 Pomperaug Valley: Hobbs, 01  
 River system: Hobbs, 01c  
 Rivers: Kummel, 93  
 Still rivers: Hobbs, 01b  
 Tectonic geography: Hobbs, 04a  
 Terraces: Cleland, 15; Davis (W M), 02  
   Connecticut Valley: Hitchcock (E), 50  
   eastern Conn.: Koons, 82  
 Thames River: Gulliver, 00, 11  
 Trap ridges, Connecticut Valley: Davis (W M), 83b  
 Triassic: Davis (W M), 98; Connecticut Valley, topographic development: Davis (W M), 89d

*Underground water.*

- Connecticut Valley, Triassic area: Fuller, 05b; Pyncheon, 05  
 General: Gregory (H E), 04, 05, 09a  
 Ground water in the crystalline rocks: Ellis (E E), 06, 09  
 Hartford, Stamford, Willimantic, and Saybrook areas: Gregory (H E), 16  
 Water supply: Gregory (H E), 06  
 Waterbury area: Ellis, 16

Connecticut Valley: Hitchcock (E), 23

**Conodonts.**

- Annelid teeth, Ontario Co., N. Y.: Clarke (J M), 87  
 Canada and New York: Hinde, 79  
 Cincinnati: James (U P), 84b

Conoplain: Ogilvie, 05a

Conosaurus: Leidy, 68g

Conrad, T. A., biography: Abbott (C C), 95

Conrad district, Yukon: Cairnes, 08a

Contact goniometer: Penfield, 00f

Contact mining district, Elko Co., Nev.: Schrader, 12

**Contact phenomena.**

- Alaska, Ketchikan and Wrangell districts: Wright (F E), 08  
 Arizona, Clifton-Morenci: Lindgren, 05e  
   Silverbell district: Stewart (C A), 12  
   Washington Camp: Crosby, 05b  
 Border segregation: Park, 05  
 British Columbia, granite altered to garnet: Brock, 15a  
 California, El Paso Range: Fairbanks, 97b  
   Mineral King district: Knopf, 05  
 Colorado, Monarch and Tomichi districts: Crawford (R D), 13  
 Connecticut, Wallingford: Chapin, 34  
 Contemporaneous deformation: Lahee, 14b  
 Garnet zones: Kemp, 12d

**Contact phenomena—Continued.**

- General: Calderon, 07; Clements, 99a; Daly, 97; Jackson, 45d; Kemp, 11a  
 Granodiorite, Concepcion del Oro, Zacatecas, Mexico: Bergeat, 09  
 Greenland, Karsuarsuk district: Heim, 11  
 Idaho, Coeur d'Alene district: Calkins, 09a; Mackay: Umpleby, 14b  
 Massachusetts, Newburyport: Clapp (C H), 09a  
 Mexico, Guanajuato, Silao: Wittich (E), 10b  
   San Luis Potosi, Dolores deposit: Spurr, 12a  
   Tamaulipas, San Jose district: Kemp, 05  
 Minnesota, basic igneous rock: Grant (U S), 00a  
 Nevada, Silver Peak quadrangle: Turner, 09  
 New Hampshire, Albany granite: Hawes, 81  
 New Mexico: Lindgren, 10  
 New York, Adirondacks, gabbros: Kemp, 94a  
   Manhattan Island: Dana (J D), 80d  
   North Creek quadrangle: Miller (W J), 14a  
   Orange Co.: Kemp, 94b  
   Peekskill, Cortlandt series: Williams (G H), 88b  
 Ontario, Long Lake mine: Uglow, 16b  
 Ore on limestone side of garnet zones: Umpleby, 16  
 Palisade diabase: Andreae, 93; Irving, 98, 99a  
 Physical effects: Barrell, 02  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 Recrystallization of limestone: Leith, 14c  
 Secondary silicate zones: Higgins, 14; Kemp, 14a; Lindgren, 14c; Stewart (C A), 14; Uglow, 13a, 14  
 South Carolina, Spartanburg Co.: Richards (G F), 88  
 Tourmaline zones, Alexandria Bay, N. Y.: Smyth (C H), 02  
 Utah, Iron Springs district: Leith, 10  
 Vermont, Ascutney Mountain: Daly, 03  
 Virginia, middle western: Watson, 13c  
 Continental clastics, characteristics: Blackwelder, 17a  
 Continental deposits, Rocky Mountain region: Davis (W M), 00  
 Continental forms, origin: Baker (H B), 13  
 Continental growth: Reade, 94  
 Continental masses, elevation of: Shaler, 66  
 Continental plateaus: Dana (J D), 73e  
 Continental platform: Hull, 12  
 Continental shelf: Shaler, 80b; Upham, 93h; origin: Cotton, 18  
 Continental shelves: Nansen, 04  
 Continents.  
   Evolution: Warring, 87  
   Formation of: Peirce, 58  
   Origin: Crosby, 83b, 84a; Dana (J D), 47  
 Continents and ocean basins, permanence: Claypole, 91d; Le Conte, 86a  
 Continents and oceans, origin: Love, 08  
 Controller Bay region, Alaska: Martin (G C), 07a, 08  
 Conularia, sessile: Ruedemann, 96, 98  
 Convexity of hilltops: Gilbert, 09b  
 Cook, G. H., biography: Gilbert, 02a; Neilson, 91; Smock, 89b; Anon, 90b  
 Cook Inlet region, Alaska: Paige, 07  
 Coon Butte. *See Arizona.*



Cooney district, N. Mex.: Graham (B), 06  
 Cooper, J. G., biography: Raymond (W J), 02  
 Coos Bay coal field, Oreg.: Diller, 11c  
 Coos Bay folio, Oreg. (no. 73): Diller, 01  
 Coosa coal field, Ala.: Prouty, 09; map: Prouty, 12  
 Cope, E. D., biography: Benjamin, 10a; Frazer, 97a, 00; Gill, 97; King, 99; Kingsley, 97a; Osborn, 97f, g, 07g, and in Cope, 98; Scott, 98c; Woodward (A S), 97  
 Copete district, Mex.: Merrill (F J H), 06b  
 Copper. *See also names of copper-producing States.*  
 Appalachian States: Kleinschmidt, 60; Lieber, 56a; Weed, 01d, 03c, 05d, 11  
 Association with garnet: Blake (W P), 04b  
 Canada: Ells, 04c; McLeish, 10, 14  
 Chalcocite, etch patterns: Tolman, 16a  
 occurrence: Graton, 15  
 origin: MacCallum, 12  
 Chalcocite enrichment: Spencer (A C), 13a  
 Chemistry: Hunt, 70e  
 Classification of ores: Fulton (C H), 16; geologic: Butler (B S), 11, 12a  
 Colorado Plateau region: Emmons (S F), 05a  
 Correlation of copper and diamonds in the glacial drift of the Great Lakes region: Farrington, 08  
 Deposition, modes of: Lindgren, 11b; by solutions of ferrous salts: Biddle, 01  
 Dispersion in drift: Salisbury, 86  
 Disseminated deposits: Keyes, 10d, e  
 Disseminated replacement deposits: Botsford, 13  
 Distribution: Newberry, 74k  
 Eastern States: Dunlop, 15  
 Enrichment of ore deposits: Emmons (W H), 17; Graton, 13; Welsh, 12  
 Enrichment of sulphide ores: Clark (J D), 14  
 Garnet contact deposits, depths at which formed: Keyes, 09d  
 General: Demaret, 00; Emmons (W H), 09, 17b; Graton, 08; Jackson, 64; Kemp, 07c; Kirchhoff, 83; Lewis, 07f; Piggot, 58; Stevens (H J), 00; Thompson (A P), 13; Tolman, 10b; Weed, 07, 14, 16, 17  
 Genesis: Chapman, 57c; Fernekes, 07; Lane, 04c; Tolman, 14; of native copper: Hollister, 83  
 Gossan outcrops of cupriferous pyrite: Turner (H W), 12a  
 Handbook: Stevens (H J), 06  
 Intergrowth of bornite and chalcocite: Rogers (A F), 16b  
 Native copper in greenstone, Pacific region: Turner, 04a  
 Occurrence and distribution in U. S.: Weed, 04d  
 Occurrence, in hematite ore: Berkey, 96b; in basic rocks: Lindgren, 11b; in sandstone: Jenks, 08; in sandstone and shale: Lindgren, 11a  
 Origin and occurrence: Lane, 11  
 Origin in Permian and Triassic beds: Emmons (S F), 04c  
 Porphyry coppers: Keyes, 10d  
 Precipitation by natural silicates: Sullivan, 05  
 Production, in the West: Kemp, 08e; United States: Weed, 05c

## Copper—Continued.

Pyrrhotite, relation to chalcopyrite and other sulphides: Thompson (A P), 14  
 Red beds type, origin: Rogers (A F), 16a  
 Southern States: Gordon (C H), 14b  
 Sulphide enrichment: Day (A L), 15, 15a; Rogers (A F), 14; laboratory studies: Young (S W), 16  
 Sulphide ores: Posnjak, 15; microscopic study: Graton 13b; Read, 13  
 Surficial indications: De Kalb, 16a; Probert, 16a  
 Triassic: Newberry, 85e  
 United States: Dieffenbach, 58; Douglas, 92; Lindgren, 09b; Odendall, 09; U S G S, 83; Weed, 05d, 06c, 07  
 Copper Creek district, Ariz.: Sibley, 09; Hafer, 14  
 Copper handbook: Stevens (H J), 00; Weed, 14  
 Copper Mountain, Alaska: Wright (C W), 15  
 Copper River district, Alaska: Brewer (W M), 08, 08a; Keller, 08; Mendenhall, 05  
 Coppermine River region: Douglas, 13; Sandberg, 13; Tyrrell, 12  
 Copperopolis ore deposits, Cal.: Reid (J A), 07a, Turner (H W), 07  
 Coprolites: Cope, 95g; Hitchcock (E), 44d; Lea, 43  
 Connecticut Valley, analysis: Dana (S L), 45  
 Indiana: Greene (G K), 97  
 New Jersey, Cretaceous: Dekay, 30, 30a  
 Texas, Permian: Neumayer, 04  
 Virginia, Richmond: Wyman, 50e  
 Coral reefs and islands.  
 Atolls, high standing, structure: Davis (W M), 17a  
 origin: Tarr, 96a  
 Bahamas: Agassiz (A), 94; Vaughan, 16b  
 Barbados: Jukes-Browne, 91  
 Barrier reefs, origin: Vaughan, 16a; platforms: Vaughan, 14e  
 Bermudas: Agassiz (A), 95; Fewkes, 88; Heilprin, 89  
 California, Tertiary: Vaughan, 04  
 Cuba: Agassiz (A), 94; Corral, 13; Crosby, 83a; Dana (J D), 83d; Taylor (R C), 36a  
 Dana's confirmation of Darwin's theory: Davis (W M), 13a  
 Devonian, New York: Smith (B), 12  
 Extinguished and resurgent reefs: Davis (W M), 16c  
 Florida: Agassiz (A), 96; Dana (J D), 83f; Hunt (E B), 63, 64; Le Conte, 57, 80a, 83b  
 Vaughan, 11b, 14c, 16, 16b  
 Formation: Cary, 18; Curtis, 15a; Daly (R A), 11, 16a, 17c; Dana (J D), 85d; Davis (W M), 14, 15b, 16d, 18; Horsford, 56; Howe (M A), 12a; Le Conte, 93a; Morris (C), 89; Vaughan, 15b  
 General: Couthouy, 42; Dana (J D), 43a, 49, 50a, 51a, 53, 72, 83f; Darwin, 89; Davis (W M), 14, 15, 15a, g, 16a; Grabau, 13; Hicks, 88a; Murray (J), 11; Nelson (R J), 53; Pirsson, 14a; Vaughan, 11, 13, 14a, 16c  
 Glacial-control theory: Daly (R A), 15a  
 Growth-rate of corals: Vaughan, 15e  
 Gulf of Mexico: Heilprin, 90a  
 Hawaiian Islands: Agassiz (A), 89; MacCaughey (V), 18



**Coral reefs and islands—Continued.**

- Isostatic subsidence of volcanic islands: Davis (W M), 17b
- Jamaica: Hill (R T), 99
- Paleozoic: Grabau, 03a
- Pleistocene glaciation and coral reef problem: Daly, 10b
- Reef-building and land-forming sea-weeds: Howe (M A), 12
- Submarine solution of limestone: Mayer, 16
- Subsidence of reef-encircled islands: Davis (W M), 18a
- Subsidence theory, new test of: Daly (R A), 16b
- Tertiary: Vaughan, 02h
- Triassic: Smith (J P), 12a
- United States, southeastern: Vaughan, 15b
- West Indies: Vaughan, 16d

**Corals. See Anthozoa.****Cordania: Clarke (J M), 92c****Cordilleran region: Ball, 34; King (C), 00; Canada: Schofield, 13****Cordilleras, glacial geology: Dawson (G M), 90c; igneous geology: Lindgren, 15a; tectonic lines: Joerg, 10; Tertiary orogeny: Ramsome, 15****Core Bank, N. C.: Cobb, 07****Corrasion: Hinman, 88; Powell, 88e****Correlation.**

- Alaska, southeastern, Mesozoic: Chapin, 18a; southern and southwestern: Martin (G C), 15
- Alexandrian series: Savage, 14a
- Algonkian: Van Hise, 92; Montana: Walcott, 06
- American and British Paleozoic: Rogers (H D), 57b
- American and European Tertiary: Osborn, 01d
- Anticosti Island: Twenhofel, 14
- Antilles, Tertiary: Jones (W F), 18
- Appalachian and eastern interior coal fields: Ashley, 07a
- Archean and Algonkian: Van Hise, 92
- Arkansas-Oklahoma: Purdue, 16
- Bedford shale: Girty, 12b
- Berea formation: Verwiebe, 16
- Berea grit, base: Cushing, 15
- Biotic conditions: Williams (H S), 93d
- California, middle and northern, Pliocene: Martin (B), 16
- Mohave region: Merriam, 13h
- southern, Tertiary: Merriam, 15h
- Tejon group: Dickerson, 16
- Cambrian: Matthew (G F), 88b; Walcott, 83e, 91, 93c; Cordillera: Burling, 14
- Cambrian-Beltian: Daly (R A), 15
- Carboniferous: Keyes, 06, 06e, 09m; Schuchert, 06b; Smith (J P), 94, 03; Williams (H S), 91
- Appalachian region: Stevenson, 06
- eastern and western interior coal fields: Keyes, 17g
- Iowa and Missouri: Keyes, 12f
- Ohio and Kansas: Mark, 12
- Texas: Gordon (C H), 11a
- United States and New Mexico: Keyes, 06a
- upper: Girty, 09

**Correlation—Continued.**

- Carrizo Creek coral reef fauna, significance: Vaughan, 17a
- Catahoula sandstone: Matson, 16a
- Cenozoic: Osborn, 10, 10a
- Ceratops beds: Stanton, 09a
- Chattanooga shale: Kindle, 12a
- Chattanooga series, Kinderhook age: Ulrich, 15
- Chester series: Ulrich, 17
- Chouteau limestone, terranal affinities: Keyes, 16e
- Cincinnati: Braun, 16
- Clastic rocks: Gilbert, 93b; McGee, 93b
- Coal beds, Rocky Mountain region: Lee (W T), 12b
- Coal Measures, Arkansas: Keyes, 98a
- Kansas and Nebraska: Beede, 99
- Ohio and Illinois: Stevens, 58a
- Pennsylvania and Ohio: White (I C), 79
- Coastal Plain formations: Clark (W B), 12a,b; Veatch (J O), 11a
- Colorado, Raton Mesa region: Lee, (W T), 17
- Columbus and Sandusky formations of Ohio: Swartz, 07a
- Contemporaneity of strata: Nicholson, 72b
- Cordillera, forty-ninth parallel: Daly, 13
- Cordilleran region: Walcott, 08a
- Cretaceous: Carstarphen, 11; Dowling, 15c; Hares, 17a; Hill (R T), 87b; Stanton, 15a; White (C A), 87d, 91a
- Alberta and Montana: Dowling, 15b
- Atlantic Coastal Plain: Clark (W B), 09a, 16c; Knapp (G N), 07
- Iowa: Keyes, 13
- New Jersey and Gulf States: Whitfield, 89c
- Texas and Oklahoma: Stephenson, 18
- Upper, Coastal Plain: Stephenson, 16b
- Wyoming: Bowen (C F), 16; Hares, 16a; Lupton, 16c; Wegemann, 17; and Colorado: Heroy, 15
- Cretaceous and Tertiary, Antilles: Vaughan, 15d; western Colorado: Gale, 08b
- Cretaceous-Eocene contact, Atlantic and Gulf Coastal Plain: Stephenson, 15
- Criteria: Keyes, 99d, 03g
- Devonian: Prosser, 13c; Williams (H S), 91, 03
- Appalachian region: Prosser, 15
- Maryland: Swartz, 13a,c; Upper Devonian: Prosser, 13e
- New York and New Jersey: Clarke (J M), 12
- northern Ohio: Stauffer, 16b
- Ohio and Indiana: Stauffer, 07a
- Ohio and Michigan: Winchell (N H), 76c
- Ohio, New York, and Michigan: Stauffer, 07
- Devonian and Mississippian faunas: Weller, 09a
- Devonian shales, Ohio and Pennsylvania: Verwiebe, 17a
- Diastrophism as the ultimate basis of correlation: Chamberlin (T C), 09a
- Early vertebrate faunas: Williston, 09a
- Eocene: Clark (W B), 91, 01
- Atlantic and Pacific: Dickerson, 18a
- Texas: Dumble, 11
- Wyoming and New Mexico: Granger, 14
- Fossils, use in correlation: Ulrich, 16; Williams (H S), 02



## Correlation—Continued.

Fox Hills formation: Stanton, 15b  
 Fox Hills sandstone and Lance formation in South Dakota, North Dakota, and Wyoming: Stanton, 10a  
 General: Agassiz (L), 63; Blanford, 84; Gilbert, 93b; Howell (E E), 79; Keyes, 97h, i, 15i, o; Lesley, 81c; Osborn, 10c; Rogers (H D), 58a; Rogers (W B), 60d  
 Glacial drift sheets: Alden, 09  
 Grand Canyon formations: Ransome, 08a, b  
 Guadalupian and Kansas sections: Beede, 10; Keyes, 10i  
 Gulf Coast formations: Matteson, 18  
 Hawthorn formation: Vaughan, 14d  
 Helderberg limestone, Pa.: Reeside, 17  
 Idaho, southeastern: Mansfield, 16  
 Jackson and Vicksburg deposits, Ala. and Miss.: Cooke (C W), 18a  
 Judith River formation: Bowen (C F), 15; Hatcher, 03d; Peale, 12  
 Jurassic and Cretaceous: Lee (W T), 15b; Osborn, 15c  
 Kinderhook formations, Mo.: Weller, 01b  
 Knobstone formation: Springer, 11  
 Lake Superior region: Allen (R C), 15; Leith, 05a; Pre-Cambrian: McKellar, 88  
 Lance Creek beds, position: Hay (O P), 10a  
 Lance formation: Lloyd, 15  
 Laramie formation and Shoshone group: Cross, 09  
 Maquoketa shales: James (J F), 90a  
 Maritime Canada and Europe: Dawson (J W), 87b  
 Martinez formation: Waring (C A), 17  
 Maryland, Coal Measures: Clark (W B), 05a  
   Devonian: Prosser, 13e; Swartz, 13a, c  
   Upper Cretaceous: Clark (W B), 16a  
 Maxville limestone, Ohio: Morse, 10  
 Mesozoic: Diller, 08  
 Mesozoic and Tertiary: Knowlton, 10b  
 Mesozoic invertebrate faunas: Stanton, 09  
 Methods: Gilbert, 91a; McGee, 93b; Williams (H S), 90; by fossil plants: Ward (L F), 92a  
 Michigan, Gogebic range: Allen (R C), 15, 15a; Huron Co., and Ohio: Cooper (W F), 00  
 Mid-Cretaceous: Osborn, 02c  
 Midway stage: Harris, 96  
 Miocene: Clark (W B), 04  
   Atlantic coast: Olsson, 14a  
   Porters Landing, Ga.: Vaughan, 10a  
 Mississippian formations: Bassler, 11; Butts, 16; Girty, 15a; Weller, 97  
   Ohio and Pennsylvania: Verwiebe, 17  
   western Kentucky: Butts, 17b  
 Montana group: Stebinger, 14b; Sternberg, 14; Thom, 17  
 Monument Creek group, Colo.: Richardson (G B), 12  
 Moorefield shale, Ark.: Girty, 11  
 Morrison formation, age: Berry, 15c; Lee (W T), 15b; Lull, 15a; Mook, 15, 16; Stanton, 15  
 Narragansett Basin: Loughlin, 14b  
 Neocene: Dall, 92  
 Newark system: Russell, 92  
 New Mexico, Raton Mesa region: Lee (W T), 17

## Correlation—Continued.

New Red sandstone, Connecticut Valley, age: Rogers (W B), 54  
 New York, Long Island, Pleistocene formations: Fuller, 14  
 New York and Mississippi Valley: Hall, 42a  
 North America, western, and France: Depéret, 13  
 North Carolina, Coastal Plain: Clark (W B), 12  
 Nova Scotia, Carboniferous: White (D), 01b  
 Ocala limestone, age: Cooke (C W), 15  
 Ohio, northeastern: Prosser, 12a  
 Ohio Valley and New York: Hall, 43c  
 Oil-bearing and oil-producing formations: Grabau, 18  
 Oklahoma, northeastern: Snider, 15  
   Pennsylvania: Bloesch, 17  
   Siluro-Devonian, Arbuckle Mountains: Reeds, 11  
 Oligocene, southern United States and Europe: Maury, 02  
 Ontario, Simcoe sheet: Johnston (W A), 09  
 Ordovician: Grabau, 13b; Raymond (P E), 16; Ulrich, 88a; Winchell (N H), 97  
   Canada: Mather, 17c  
   Ontario: Johnston (W A), 11  
   Ontario and Quebec: Raymond (P E), 13j  
   Tennessee and New York: Safford, 53  
   Trenton of Kentucky and Tennessee: Foerste, 13d  
 Ordovician and Silurian: Savage, 10a; Schuchert, 10d  
 Ordovician, Silurian, and Devonian: Grabau, 09a  
 Orotaxial correlation: Keyes, 09l, o  
 Orotaxis: Keyes, 96g  
 Pacific Coast: Arnold, 09b; Smith (W D), 17  
 Paleogeography: Schuchert, 16  
 Paleontologic methods: Smith (J P), 00a  
 Paleozoic, table of formations: Winchell (A), 69b  
   America and Europe: Sharpe, 48  
   American and British: Rogers (H D), 57b  
   New York-Ohio-Kentucky: Whittlesey, 51b  
   United States and Europe: Hall, 51d  
   upper: White (D), 09a  
 Paleozoic systems, revision: Ulrich, 09a, 11a  
 Panama, Tertiary: Vaughan, 18c  
 Pennsylvanian: Savage, 18c; Oklahoma: Bloesch, 17  
 Permo-Carboniferous: Case, 15, 18a  
 Philipsburg quadrangle, Mont.: Emmons (W H), 13b  
 Piedmont, eastern: Mathews, 04  
 Plants, use of: Knowlton, 16d; Ward (L F), 92a, 93  
 Pleistocene: Salisbury, 09  
 Potomac formation, age: Berry, 11b; Gilbert, 96c  
 Pre-Cambrian: Adams (F D), 07, 09b; Coleman, 12b, 14a; Collins (W H), 14b; Lane, 05i, 15, 17; Lawson, 02a, 13c, 16; Leith, 14; Miller (W G), 07a, 14a; Pumpelly, 93a; Schofield, 14b; Van Hise, 92, 93, 05, 09, 09a; Wilson (M E), 18a; Winchell (N H), 09  
 British Columbia: Schofield, 15



## Correlation—Continued.

- Pre-Cambrian: Canada: Miller (W G), 14; Wilson (M E), 13a  
 Hudson Bay and Lake Superior regions: Leith, 10a  
 Lake Superior region: Bell (R), 94; Leith, 10a, 15b; Van Hise, 11; Whittlesey, 76  
 Rocky Mountain region: Schofield, 15  
 Timiskaming region, Ont.: Collins (W H), 13e  
 Principles of correlation: Keyes, 09n; McGee, 90; Matthew (W D), 13; Smith (J P), 00a; Ulrich, 11, 13  
 Puerco and Laramie deposits, relations: Cope, 85u  
 Quaternary, America and Europe, parallelism: Desor, 51d; drift deposits, Europe and America: Deeley, 13  
 Red beds, Colo.: Cross, 05c; stratigraphic position: Keyes, 08f  
 Rocky Mountain region: Hares, 16; Tomlinson, 17; physiographic methods of correlation: Lee (W T), 17c  
 Rocky Mountains and Plateau belt: Cross, 07  
 San Lorenzo series, Cal.: Clark (B L), 18b  
 Sediments, character, use of: Blackwelder, 18a  
 Silurian: Grabau, 13b; Prosser, 16; Savage, 16a  
 Maine, Williams (H S), 12b; Pennsylvania, Bellefonte region: Brown (T C), 13  
 Silurian and Ordovician: Savage, 10a; Schuchert, 10d; Baltic provinces: Twenhofel, 16; Sweden and America: Kemp, 11c  
 Strand line displacements: Ulrich, 16  
 Symposium on correlation: Willis, 09a  
 Synchronizing strata: Keyes, 97c  
 Taconic: Marcou, 90c  
 Tejon, Eocene age: Harris, 93b  
 Tertiary: Dall, 09a; Heilprin, 84; Merriam, 15b; Osborn, 00h, i, 09, 12g; Vaughan, 00a  
 Antilles: Jones (W F), 18  
 Atlantic Coastal Plain: Clark (W B), 10b  
 California and Great Basin: Merriam, 14b  
 Cordilleran region: Matthew (W D), 15  
 marine, and intracontinental: Hilgard, 87a  
 New Mexico: Gardner (J H), 10e  
 Pacific coast: Anderson (F M), 08; Arnold, 13; Clark (B L), 15a  
 Texas: Dumble, 15  
 southeastern United States: Vaughan, 18c; and Antillean region: Vaughan, 18d  
 Wasatch Mountains: Hintze, 13  
 Tertiary-Cretaceous, southern California: Waring (C A), 17  
 Texas, Coastal Plain: Deussen, 14; Marathon Basin: Baker (C L), 17  
 Time element: Stanton, 05d  
 Triassic: Martin (G C), 16; Wherry, 12e  
 Unconformity between Mississippian and Pennsylvanian: Butts, 08  
 Upper Cretaceous: Berry, 16; Clark (W B), 16a  
 Utah, Iron Springs district and Colob Plateau: Leith, 08a  
 Vertebrate fossils, use in correlation: Marsh, 91e; Matthew (W D), 16e  
 Virginia, Coastal Plain formations: Clark (W B), 12b

## Correlation—Continued.

- Wasatch Mountains formations: Blackwelder, 10a  
 Waverly group, northeastern Ohio: Girty, 01  
 West, middle, marine with nonmarine formations: Hatcher, 04  
 Western interior coal field: Keyes, 01k  
 Western phosphate field: Mansfield (G R), 17  
 Wyoming: Trumbull, 17; Cretaceous and Eocene: Hares, 15  
 Corsicana oil and gas field, Texas: Matson, 17b  
 Cortlandt series: Dana (J D), 80d; Rogers (G S), 11, 11a; Williams (G H), 88b; near Peekskill, N. Y.: Berkey, 08c; Rosetown extension: Kemp, 88b  
 Corundum.  
 Appalachians, southern: Holmes (J A), 96  
 Canada: Young (G A), 09  
 General: Barlow, 15; Fuller (H T), 04; Genth, 74a; Miller (W G), 99; Pratt, 01  
 Georgia: King (F P), 94; McCallie, 10  
 Montana, Gallatin Co.: Edman, 02  
 North Carolina: Pratt, 05  
 Ontario: Barlow, 05; Corkill, 06; eastern: Miller (W G), 99a  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 South Carolina: Sloan, 07, 08  
 United States: Pratt, 01, 06  
 Virginia: Watson, 07e  
 Corynotrya: Bassler, 11b  
 Coryphodon: Earle, 92a; Marsh, 76c; Osborn, 98l; restoration: Marsh, 93c; structure: Cope 78v  
 Coryphodontidae: Marsh, 77  
 Corythosaurus: Matthew (W D), 15e; Alberta: Brown (B), 14c  
 Cosmogony, relation of radioactivity to: Becker (G F), 08a; Day (A L), 08  
 Cosna-Nowitna region, Alaska: Eakin, 16a, 18  
 Coso Range, Cal.: Reid (J A), 08  
 Costa Rica.  
 General: Alfaro, 11a; Church (G E), 97; Gabb, 74; Hill (R T), 96b, 98c  
 San Juan Valley: Merz, 07  
 Sixaola River region: MacDonald (D F), 14; Miller (B L), 14  
 Talamanca region: Gabb, 95; MacDonald (D F), 14; Miller (B L), 14  
 Economic geology.  
 Augacate mines: Crespi, 07  
 General: Attwood, 82  
 Manganese: Spilsbury, 18; Yonge, 17  
 Mineral resources: Fraser, 11  
 Historical geology.  
 General: Attwood, 82; Hill (R T), 98c; Romanes, 12; Sapper, 05a  
 Peninsula of Nicoya: Romanes, 12a  
 Sedimentary formations: Alfaro, 13a  
 Sixaola River region: MacDonald (D F), 14; Miller (B L), 14  
 Talamanca region: Gabb, 11; MacDonald (D F), 14; Miller (B L), 14  
 Paleontology.  
 Bryozoa, Miocene: Canu, 18a  
 Echini: Jackson (R T), 17, 18  
 Miocene Invertebrata: Gabb, 81



## Costa Rica—Continued.

*Paleontology*—Continued.

New species of fossil shells: Dall, 12a

Pliocene: Gabb, 81a

Resins, fossil: Michaud, 11

Scaphopoda: Pilsbry, 11

Tertiary, Chiriqui: Gabb, 60j.

*Petrology*.

General: Attwood, 82

Theralite: Wolff, 96a

Volcanic rocks: Alfaro, 13; Nicholas, 10

*Physical geology*.

Earthquakes: Alfaro, 11; Dutton, 91a; Jaggar, 11, 11a; Jones (J O), 03

Cartago earthquake, 1910: Fernández, 10

February 27, 1916: Tristán, 16

Guatuso, 1911: Tristán, 12b

May 4, 1910: Alfaro, 10

Sarchi, 1212: Sapper, 12; Tristán, 12g

Toro Amarillo: Alfaro, 12

1888: Michaud, 12

1900: Tristán, 12d

1910-1911: Tristán, 12c

1911: Tristán, 12f

1912: Tristán, 12a

Earthquakes and volcanic eruptions: González Viquez, 10; Tristán, 12

Volcanoes: Dutton, 91a; Frantzius, 61; Jones (J O), 03; Pittier, 10

Irazú, eruptions, 1917-8: Calvert, 18; Tristán, 17

Miravalles: Peralta, 14; Tristán, 14

Poás, eruptions: Sapper, 11; Tristán, 16a

Reventado: Tristán, 12e

*Physiographic geology*.

General: Pittier, 12

Costigan coal basin, Alta.: Dowling, 05

Côteau des Prairies: Catlin, 40

Cottonwood limestone, Kans.: Yates, 11

Cottonwood Falls folio, Kans. (no. 109): Prosser, 04

Cotylosauria: Cope, 96e; Moodie, 09; Williston, 08; revision: Case, 11

Counter currents: Lawes, 11

Covada district, Wash.: Weaver, 13

Cove Creek sulphur beds, Utah: Lee (W T), 07

Cowlitz River valley, Wash.: Collier, 13

Cox, E. T., biography: Merrill (G P), 08b

Cozzens, I., biography: Vogdes, 99

Cracker Creek district, Oreg.: Pardee, 09

Craftsbury terranes, Vt.: Richardson (C H), 12

Craigton Lake, tilted shore lines: Hubbard (G D), 14a

Cranberry folio, Tenn.-N. C. (no. 90): Keith, 03

Cranbrook area, B. C.: Schofield, 15

Crangopsis: Ortmann, 97

Cranimetry of Equidæ: Osborn, 12e

Crater Lake, Oreg.: Diller, 96c, 97, 11d; Martin (L), 13b

Crater Lake National Park: Diller, 02

Craterophyllum verticillatum: Barbour (E H), 11a

Craters, origin: Gilbert, 93

Crazy Mountains, Mont.: Mansfield, 09; Stone (R W), 09; Wolff (J E), 08b

Creede district, Colo.: Emmons (W H), 13d

Creodonta: Cope, 81h, 84o; Matthew (W D), 01a; Scott, 92b; Wortman, 00

Creosaurus: Osborn, 03c; Williston, 01a

Crescentic fractures of glacial origin: Lahee, 12

Crescentic gouges: Gilbert, 06

Cretaceous.

Alabama: Hager, 18; Langdon, 91a; Smith (E A), 87, 92b, 03, 05a, 06; Thornton, 58; Tuomey, 50, 58; Winchell (A), 57

Choctaw Bluff: Winchell (A), 56

Coastal Plain: Smith (E A), 94

Cretaceous-Eocene contact: Smith (E A), 10a eastern: Langdon, 94

Alaska: Brooks, 02; Eichwald, 71; Martin (G C), 12

Alaska Peninsula: Atwood, 11; and Cook Inlet: Stanton, 05c

Anvik-Andreafski region: Harrington (G L), 18

Berners Bay region: Knopf, 11

Chandler-Koyukuk region: Schrader, 00b

Chitina Valley: Moffit, 18

Circle quadrangle: Prindle, 13b

Cook Inlet region: Paige, 07

Herendeen Bay field: Paige, 06

Fairbanks quadrangle: Prindle, 13

Iditarod-Ruby region: Eakin, 14

Innoko district: Maddren, 10

Kotsina-Chitina region: Moffit, 09b

Koyukuk-Chandalar region: Maddren, 13

Matanuska Valley: Martin (G C), 12b; Paige, 07b

Mount McKinley region: Brooks, 11

Nelchina-Susitna region: Chapin, 18

Noatak-Kobuk region: Smith (P S), 13a

Norton Bay-Nulato region: Smith (P S), 11c

Nulato-Council region: Smith (P S), 10a

Orange group: Cairnes, 12e

Rampart region: Prindle, 06b

Rocky Mountains: Schrader, 02

Seward Peninsula, southeastern: Smith (P S), 11c

southwestern: Spurr, 00

Talkeetna basin: Paige, 07b

upper Yukon region: Brooks, 08a

Yukon-Tanana region: Prindle, 05, 08

Alaska-Yukon boundary: Cairnes, 12a

Alberta: Bell, 85d; Dawson (G M), 83, 84a, 89b; Dawson (J W), 86a, 87a, 88d; Dowling, 09b, 13a, 15b, e; Malcolm, 13; Sinclair (J H), 16

Anthracite: Poole, 03a

Athabasca River: Bell (R), 85a, 08a; McLearn, 17; Tyrrell, 98b

Athabasca-Churchill rivers region: Tyrrell, 96

Bighorn coal basin: Malloch, 11

Blairmore area: Leach, 12

Blairmore-Frank coal fields: Leach, 03

Bow and Belly rivers region: Dawson (G M), 85

Cascade basin: Dowling, 07

central: Allan, 18

Costigan coal basin: Dowling, 05

Crowsnest Pass: McLearn, 16

Crowsnest River: McLearn, 15

Crowsnest volcanics: MacKenzie, 14b

Edmonton field: Dowling, 10a; MacLean (A), 13

Jasper Park: Dowling, 11a



## Cretaceous—Continued.

- Alberta: Moose Mountain district: Cairnes, 07; Dowling, 06b  
 northern: McConnell, 93; Slipper, 16  
 North Saskatchewan River, country south of: Tyrrell, 87  
 oil fields: Dowling, 15c  
 Peace River region: Dawson (G M), 81d; McLearn, 18  
 Roche Miette area: Dowling, 12; Rocky Mountains: Allan, 13; McConnell, 87  
 Sheep River district: Dowling, 14a, c  
 South Fork district: MacKenzie, 14  
 southern: Dowling, 17  
 southwestern: Stewart (J S), 16  
 Viking field: Slipper, 18a  
 western: Leach, 13  
 Yellow Head Pass region: McEvoy, 00
- Amboy clay series, age: Hollick, 98f
- Antigua: Guppy, 11
- Antilles: Vaughan, 15d
- Arctic regions: Dawson, 87a; Feilden, 78
- Arizona: Newberry, 61  
 Bisbee quadrangle: Ransome, 04b  
 Black Mesa coal field: Campbell (M R), 11c  
 Clifton quadrangle: Lindgren, 05  
 Clifton-Morenci district: Lindgren, 05a  
 Grand Canyon district: Dutton, 82  
 Navajo country: Gregory (H E), 17  
 Pinedale coal field: Veatch (A C), 11  
 southeastern: Dumble, 02  
 Sulphur Spring Valley: Meinzer, 13  
 Warren district: Bonillas, 16
- Arkansas: Hay (O P), 88; Hill (R T), 89d, e, 92f; Marcou, 89g; Taff, 02b; Veatch (A C), 06e  
 Arkansas River: Warder, 54  
 Caddo Gap and De Queen quadrangles: Miser, 18  
 Comanche series: Hill (R T), 91  
 northeastern: Stephenson, 16a  
 Red River region: Hill (R T), 94  
 southwestern: Branner, 98a; Hill (R T), 88; Miser, 18a
- Atlantic and Gulf Coastal Plain, correlation: Stephenson, 16b
- Atlantic Coastal Plain: Berry, 03, 09e; Clark (W B), 95a, 16c; Cope, 68 e; Vanuxem, 29a
- Atlantosaurus beds: Williston, 05; age: Lee, (W T), 03a
- Barbados: Guppy, 11
- Bear River formation: Stanton, 92; White (C A), 92, 95; Idaho: Mansfield, 16
- Beckwith formation, Idaho: Mansfield, 16
- Belly River beds: Hatcher, 03d; age: Osborn, 03d
- Black Hills region: Hayden, 58; Meek, 58b
- British Columbia: Dawson (G M), 81b, 89b, 90d; Dowling, 15a; Whiteaves, 83  
 Ashcroft: Evans (H F), 05b  
 Cariboo district: Bowman, 88  
 Coast Range: Camsell, 13a  
 Crowsnest and Flathead areas: Rose, 18  
 Crows Nest field: Leach, 02; McEvoy, 01a  
 eastern: Leach, 13  
 Flathead area: MacKenzie, 16a  
 Fraser Canyon: Camsell, 12  
 Fraser River valley: Bowen (N L), 14

## Cretaceous—Continued.

- British Columbia: Galiano, Mayne, and Saturna islands: Clapp (C H), 14f  
 Graham Island: Clapp (C H), 14a; Ells, 06b; MacKenzie, 14a, 16b  
 Groundhog coal field: Malloch, 14  
 Kamloops area: Dawson (G M), 95  
 Lillooet-Chilko Lake: Bateman, 14  
 Nanaimo area: Clapp (C H), 14  
 New Westminster and Nanaimo districts: LeRoy, 08  
 northern: Dawson (G M), 81a; Whiteaves, 77  
 Peace River canyon: Galloway, 13  
 Peace River region: Dawson (G M), 81d  
 Prince Rupert-Aldermere: McConnell, 14a  
 Quadra Island: Cairnes, 14e  
 Queen Charlotte Islands: Dawson (G M), 80; Whiteaves, 85c  
 Rocky Mountains: Dawson (G M), 95e  
 Saltspring and Vancouver islands: Allan, 10  
 Skagit Valley, Yale district: Camsell, 12b  
 Skeena River district: Leach, 10; McConnell, 13; Malloch, 12a  
 southern interior: Dawson (G M), 79  
 Telkwa River district: Dolmage, 17  
 Texada and Moresby islands: McConnell, 10a  
 Texada Island: McConnell, 14  
 Thompson River valley: Drysdale, 14  
 Tulameen district: Camsell, 13  
 Vancouver area: Burwash, 18  
 Vancouver Island: Bauerman, 60; Clapp (C H), 09, 12, 12c, 13c; Dawson (J W), 89b, 94c; Haycock, 03  
 Cooke and Duncan areas: Clapp (C H), 17  
 Duncan area: Clapp (C H), 14d  
 Nanaimo sheet: Clapp (C H), 12a  
 northern part: Dawson (G M), 87  
 Victoria and Saanich quadrangles: Clapp (C H), 11
- California: Anderson (F M), 02; Becker, 91b; Conrad, 67a; Diller, 08; Gabb, 67; Marcou, 83; Stanton, 96, 96b; Smith (J P), 10, 16; White (C A), 85
- Berkeley Hills: Lawson, 02
- Cantua-Panoche region: Anderson (R), 11
- Coalinga district: Arnold, 08g, 09a, 10; Dumble, 12; Pack, 14b
- Coast Ranges: Becker, 86a; Fairbanks, 92, 94d, 95a; Lawson, 95a; Osmont, 05; Turner, 94d; southern: Fairbanks, 98; Cuyama Valley: English, 16
- Klamath Mountains: Anderson (F M), 02a; Diller, 03d; Hershey, 02e
- Lassen Peak district: Diller, 89, 95
- McKittrick-Sunset district: Arnold, 10a; Johnson (H R) 09
- Martinez group: Merriam, 97
- Marysville Buttes: Dickerson, 17e
- Mother Lode district: Ransome, 00
- Mount Diablo Range: Anderson (F M), 06, 08; Turner, 91
- northern: Diller, 86, 90a, 93
- Placerville quadrangle: Lindgren, 94
- Redding quadrangle: Diller, 06
- Sacramento quadrangle: Lindgren, 94a
- Salinas Valley: English, 18
- San Francisco district: Lawson, 95, 14



## Cretaceous—Continued.

California: San Joaquin Valley (western border): Anderson (R), 15  
 San Luis quadrangle: Fairbanks, 04  
 Santa Ana Mountains: Dickerson, 14b; Packard (E L), 16  
 Santa Clara Valley: Crandall (R), 07  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria district: Arnold, 07d, f  
 Shasta-Chico series: Diller, 94a  
 Sierra Nevada: Turner, 94c, 96  
 Wallala beds: Fairbanks, 93d  
 Canada: Ami, 00a, 01h; Dawson (G M), 83a, 92; Dawson (J W), 93a; Dowling, 09; Selwyn, 84; Whiteaves, 94  
 forty-ninth parallel: Dawson (G M), 75  
 Rocky Mountain region: Dawson (G M), 01; Hector, 63  
 western: Hector, 61; Ries, 12c  
 Cannonball member of Lance formation: Lloyd, 14a  
 Ceratops beds: Stanton, 09  
 Classification: Eldridge, 89a; Morton, 35; New Jersey: Weller, 05a; and distribution: Cope, 75  
 Climate: Bibbins, 07  
 Coastal Plain formations: Clark (W B), 09a; Maryland and Virginia: Darton, 91b  
 Colorado: Martin (G C), 09; Marvine, 74; Ziegler, 18b  
 Anthracite-Crested Butte quadrangles: Eldridge, 94  
 Apishapa quadrangle: Stose, 12  
 Arkansas Valley: Darton, 06f; Gilbert, 96a  
 Aspen district: Spurr, 98  
 Book Cliffs region: Richardson (G B), 07a, 09b  
 Boulder district: Fenneman, 05b; Henderson (J), 04  
 Canon City: Hatcher, 01d  
 Canon City coal fields: Stevenson, 82; Washburne, 10a  
 Castle Rock region: Lee (W T), 02b; Richardson (G B), 15  
 central: Peale, 76  
 Colorado Springs district: Finlay (G I), 16; Goldman, 10  
 Dakota formation, age: Todd, 11  
 Denver region: Cannon, 95b; Cross, 84; Eldridge, 89, 90; Emmons (S F), 96  
 Durango district: Shaler (M K), 07b; Taff, 07  
 eastern: Collier, 66  
 Elk Mountains: Holmes (W H), 76  
 Elmore quadrangle: Hills, 99  
 Florence field: Eldridge, 92; Washburne, 09b  
 Fox Hills group: Stevenson, 79a  
 Front Range: Hayden, 76  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand Mesa coal field: Lee (W T), 09  
 Grand River district: Peale, 77, 78  
 Hahns Peak region, Routt Co.: Gale, 06; George (R D), 09c  
 La Plata quadrangle: Cross, 99a  
 Laramie group: Stevenson, 79b  
 Middle Park: Cross, 95a  
 Morrison formation: Lee (W T), 01

## Cretaceous—Continued.

Colorado: Nepesta quadrangle: Fisher (C A), 06a  
 north central: Henderson (J), 09  
 northeastern: Heroy, 15  
 northern: Ziegler, 17b  
 North Park: Beekly, 15  
 northwestern: Gale, 07a, 09, 10; Henderson (J), 10a; White (C A), 78d, 89  
 Ouray quadrangle: Cross 07a  
 Perry Park: Cannon, 91a; Kruger, 10  
 Pikes Peak sheet: Cross, 94  
 post-Laramie deposits: Cross, 92  
 Pueblo quadrangle: Gilbert, 97  
 Rabbit Ears region: Grout, 13a  
 Rangely district: Gale, 08b  
 Raton Mesa region: Knowlton, 13; Lee (W T), 17  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain front range: Darton, 04c  
 Rocky Mountains: Hills, 91c  
 Routt Co.: Fenneman, 06b  
 sandstone of Fossil Ridge: Henderson (J), 08a  
 San Juan district: Endlich 76; Holmes (W H), 77  
 San Luis district: Endlich, 74  
 southern: Endlich, 77; Gardner, 09a; Stevenson, 75, 79, 81, 89  
 southwestern: Forrester, 18; Spencer (A C), 98  
 Spanish Peaks quadrangle: Hills, 01  
 Telluride quadrangle: Cross, 99  
 Trinidad region: Lakes, 86; Richardson (G B), 10  
 Walsenburg quadrangle: Hills, 00  
 western: Cross, 07  
 White River district: Endlich, 78  
 Colorado formation: Logan, 99a; Stanton, 93  
 Colorado Plateau: Newberry, 76  
 Comanche formation, southeastern Colo.: Darton, 05j  
 Comanche series: Hill (R T), 91, 95a; Oklahoma and Kansas: Vaughan, 97  
 Cordilleran region: King (C), 78a; Lindgren, 15a; forty-ninth parallel: Daly (R A), 13  
 Correlation: Berry, 16; Stanton, 15a; White (C A), 89c, 91a; Montana and Wyoming: Hares, 17a  
 Cretaceous-Eocene contact, Atlantic and Gulf Coastal Plain: Stephenson, 14b, 15  
 Cretaceous-Tertiary boundary: Ashley, 15a; Brown (B), 14; Cross, 96b; Knowlton, 14a; Matthew (W D), 14; Osborn, 14; Stanton, 14  
 Cuba: DeGolyer, 18; Spencer (J W), 95a  
 Habana y Guanabacoa: Salterain y Legarra, 80  
 Dakota group: Hayden, 67b; Lesquereux, 74a; Sternberg, 81c; Kansas and Nebraska: Gould, 01e  
 Dakota sand: Huntley, 15a  
 Delaware: Booth, 41; Chester (F D), 84, 84a; Clark (W B), 97c, 07; Matson, 13; Dover quadrangle: Miller (B L), 06  
 Denver formation, age: Cope 89n; origin: Davis (W M), 97a  
 District of Columbia: Darton, 01; McGee, 86  
 Potomac formation: Sinnott, 16



## Cretaceous—Continued.

Eastern Gulf region: Stephenson, 14  
 Formations and faunas: Stanton, 97a  
 Fox Hills sandstone: Knowlton, 16; and Lance formation: Stanton, 10a  
 Fox Hills group, Colo.: Stevenson, 79a  
 General: Branner, 97b; Buch, 49; Cope, 74, 74b, 87c, f; Gardner (J S), 84; Hall, 57a; Herrick, 00b; Hill (R T), 89g; Lea, 58a; Lesquereux, 82a; Marcou, 85b; Miller (S A), 81; Morton, 30; Newberry, 81d; Nicollet, 41; White (C A), 89b, c  
 Georgia: Berry, 14; McCallie, 10; Veatch (J O), 09  
   central: Veatch (J O), 07  
   Coastal Plain: Brantley, 16; Shearer, 17; Stephenson, 15a; Veatch (J O), 11a  
   Dry Branch region: Veatch (J O), 08b  
   southwestern: Spencer (J W), 91a  
 Great Plains: Darton, 05, 18a; Engelmann, 76; Hay (R), 92a; Marcou, 97a; White (C A), 82; northern: Hayden, 62  
 Greenland: Böggild, 17  
   northeastern: Ravn, 11  
   west coast: White (D), 98a  
   western: Heim, 11b; Ravn, 18  
 Guatemala: Sapper, 94b  
 Gulf region: Hilgard, 71a; eastern, and Carolinas: Stephenson, 14  
 Hailey shales, Wyo.: Williston, 05c  
 Idaho, southeastern: Mansfield, 16, 16c; Richards (R W), 14a; Schultz, 13, 18  
 Idaho-Wyoming border: Breger, 10  
 Illinois, southern: Purdy, 07; Shaw (E W), 17c; Weller, 06a  
 Iowa: Beyer, 07c; Calhoun, 06a; Calvin, 93, 93d; Keyes, 92h, 93a, 13j; Lonsdale, 94; Norton, 12; White (C A), 70, 73  
   Carroll Co.: Bain, 99a  
   Guthrie Co.: Bain, 97c; White (C A), 69b  
   gypsum region: Keyes, 95b  
   Lyon Co.: Wilder, 00  
   Montgomery Co.: Lonsdale, 95  
   northwestern: Keyes, 94i  
   Page Co.: Calvin, 01  
   Plymouth Co.: Bain, 98b  
   Pottawatamie Co.: Udden, 01a  
   Sac and Ida cos.: Macbride, 06  
   Sioux Co.: Wilder, 00  
   Sioux Valley: Bain, 95a  
   western: White (C A), 88a  
   Woodbury Co.: Bain, 96b  
 Island series: Ward, 96a  
 Jamaica: Duncan, 65; Sawkins, 69  
   Clarendon district: Duncan, 65  
   southeastern: Barrett, 60  
   Yellow limestone: Hill (R T), 97  
 Judith River beds: Cope, 77a; Hatcher, 02f, 03c, d; Stanton, 02, 05; Sternberg 81d, 83, 03a  
 Jurassic-Cretaceous boundary: Hill (R T), 96; Osborn, 15c  
 Kansas: Cope, 72; Gould, 00; Hay (R), 89, 93a, 96a; Meek, 58c, 59a, b, 65b; Moore (R C), 17; Mudge, 66, 75b, 76, 77, 78; St. John, 83c; Wooster, 00

## Cretaceous—Continued.

Kansas: Arkansas Valley: Mudge, 73a  
   Belvidere beds: Cragin, 95b  
   central: Mudge, 73; Perrine, 18  
   Cheyenne sandstone: Cragin, 90, 91; Prosser, 99c  
   Dakota group: Gould, 01e  
   Dakota sandstone: Hay (R), 85b  
   Fort Riley Reservation: Hay (R), 96  
   Logan and Gove cos.: Adams (G I), 98a  
   Lower Cretaceous: Prosser, 97b  
   Mentor beds: Cragin, 95a  
   Niobrara formation: Williston, 93, 97  
   northern, Dakota-Permian contact: Greene (F C), 10  
   northwestern: Hay (R), 89d  
   Norton Co.: Hay (R), 85  
   southern: Cragin, 89  
   southwestern: Case, 94; Haworth, 97; Hay (R), 90; St. John, 87; Ward (L F), 97c  
   Upper Cretaceous: Adams (G I), 98; Logan, 97  
   Washington Co., Dakota sandstone: Charles, 01  
 Kentucky: Glenn, 06; western: Loughridge, 88  
 Kootenai, age: Berry, 15c  
 Lance formation: Hay (O P), 10a; Knowlton, 11a  
 Laramie beds: Bannister, 79; Bowen (C F), 16; Cope, 78t, 90c; Cross, 09; Gardner, 80; Hay (O P), 03c; Neumayer, 84; Newberry, 89b; Peale, 79b; Schimper, 79; Stanton, 97; Stevenson, 81, 90b; Veatch (A C), 07; Ward (L F), 90; White (C A), 78b, 88b; Williston, 02i  
 Lignite beds, age: Cope, 74i; Stevenson, 75c  
 Lignitic group: Hayden, 74a, 76a  
 Louisiana: Harris, 99a; Hopkins (F V), 70, 71, 72; Veatch (A C), 06e, g  
   Caddo oil and gas field: Matson, 16b  
   De Soto-Red River field: Matson, 17a  
   northern: Lerch, 92, 93; Veatch (A C), 02  
   northwestern: Harris, 09b; Vaughan, 95, 96  
   Winnfield sheet: Harris (G D), 07  
 Lower Cretaceous: Stanton, 97a  
 Magothy formation of Atlantic islands: Bibbins, 09, 10  
 Manitoba: Dawson (J W), 76b; Malcolm, 13; Tyrrell, 90b  
   Lake Winnipeg region: Dowling, 00a; Tyrrell, 00  
 Pembina Mountain: MacLean, 16  
   western: Tyrrell, 92  
 Marine opening beds: Pavlow, 92  
 Martinez group, Cal.: Merriam, 97  
 Maryland: Bryan, 89; Clark (W B), 97b, c, 06c, 07, 11, 16; Ries, 02a; Uhler, 88a, 89, 90  
 Albirupean series: Uhler, 92  
 Anne Arundel and Prince Georges cos.: Clark (W B), 89  
 Anne Arundel Co.: Little, 17  
 Baltimore area: Darton, 92a  
 Cecil Co.: Shattuck, 02  
 Dover quadrangle: Miller (B L), 06  
 eastern shore: Roberts, 96  
 Magothy formation: Darton, 93b



## Cretaceous—Continued.

- Maryland: Patuxent quadrangle: Shattuck, 07c  
 Potomac group: Clark (W B), 97d, 02b;  
 Fontaine, 96  
 Prince Georges Co.: Miller (B L), 11  
 southern: Clark (W B), 91b  
 Tolchester quadrangle: Miller (B L), 17  
 Washington quadrangles: Darton, 01  
 Massachusetts: Clapp (F G), 07; Emerson  
 (B K), 17  
 eastern: Shaler, 90b  
 Marthas Vineyard: Shaler, 88, 89d; Uhler,  
 92a, c; White (D), 92; Woodworth, 97  
 Matawan formation: Berry, 03; Clark (W B),  
 04b  
 Mentor beds, Kans.: Jones (A W), 98, 99, 03  
 Mesozoic floras of North and South America:  
 Knowlton, 18  
 Mesozoic invertebrate faunas: Stanton, 09  
 Mexican boundary: Hall, 57a  
 Mexico: Heilprin, 91a; Hill (R T), 93d  
 Caprina limestone: Boehm, 98  
 Chiapas and Tabasco: Böse, 05; Sapper, 94c,  
 96a  
 Chihuahua: Kimball, 69, 70; Las Plomosas:  
 Burrows (R H), 09  
 Coahuila: Aguilera, 06b, 09c; Dumble, 95;  
 Haarman, 13  
 coastal area: Dumble, 15c  
 Cerro de Muleros: Böse, 10  
 Colima: Angermann, 07b  
 Durango: Angermann, 07, 07a; Böse, 10a, b;  
 Burckhardt, 10, 10b; Spurr, 08a; San  
 Pedro del Gallo: Burckhardt, 10a, 12  
 eastern: DeGolyer, 15b; Dumble, 12a, 15a  
 Furbero field: DeGolyer, 15a  
 Guanajuato district: Botsford, 09  
 Guerrero, Chilpancingo: Ordóñez, 89b; Iguala-  
 San Miguel Totolapa: Hall (C E), 03  
 Hidalgo, Tulancingo: Galvez, 16; Villarello,  
 02  
 Jalapa: Galeotti, 39  
 Jalisco: Bárcena, 91  
 Lower California, southern: Heim, 16; Todos  
 Santos Bay: Lindgren, 89  
 northeastern: Dumble, 11b, 15b; Garfias, 15;  
 White (I C), 13  
 northern: Rémond, 66; White (C A), 90  
 Puebla, San Juan Raya: Villada, 05; Tehua-  
 can: Böse, 16a  
 Rio Grande region: Schott, 55  
 Rio Nazas region: Burckhardt, 09  
 San Luis Potosi á Tampico: Böse, 06g  
 Sierra de Mazapil et Santa Rosa: Burckhardt,  
 06b  
 Sierra Madre: Böse, 01  
 Sonora: Dumble, 00a  
 Moctezuma region: Aguilera, 88  
 Obispo Canyon: Dumble, 01  
 Sahuaripa Valley: Gabb, 64b  
 Tampico embayment area: Dumble, 18  
 Vera Cruz, Orizaba district: Böse, 99  
 Yucatan: Sapper, 96  
 Mid-Cretaceous, correlation: Osborn, 02c  
 Minnesota: Grout, 14; Hall, 69a; Kloos, 77;  
 Sardeson, 98a; Van Hise, 11; Winchell  
 (N H), 73a, 75d, 78f, 01

## Cretaceous—Continued.

- Minnesota: Blue Earth Co.: Upham, 84  
 Brown and Redwood cos.: Upham, 84  
 Crow Wing and Morrison cos.: Upham, 88  
 Fillmore Co.: Winchell (N H), 76  
 Goodhue Co.: Winchell (N H), 88a  
 Hennepin Co.: Winchell (N H), 88a  
 Itasca Co.: Grant (U S), 99  
 Minnesota Valley: Winchell (N H), 74b  
 Mower Co.: Winchell (N H), 75c, 84a  
 northern: Winchell (H V), 93a  
 Olmstead Co.: Harrington (M W), 76  
 Redstone region: Sardeson, 08a  
 Sauk Valley: Kloos, 72  
 southern: Hall (C W), 11a  
 Stearns Co.: Upham, 88  
 Yellow Medicine, Lyon and Lincoln cos.:  
 Upham, 84  
 Mississippi: Crider, 06, 06b; Harper, 57; Hilgard,  
 60; Lieber, 54; Logan (W N), 16; Lowe,  
 15; Stephenson, 17; Thornton, 58  
 Oktibbeha Co.: Logan, 04a  
 Vicksburg-Jackson area: Hopkins (O B), 16  
 Missouri: Swallow, 58; Ozark Mountains:  
 Keyes, 95g  
 Missouri River region: Cope, 77f; Hayden, 57,  
 66b, e, 71; Meek, 57, 61d  
 Montana: Fisher, 08a; Leonard, 07; Meek, 56;  
 Pepperberg, 09; Stanton, 05; Stebinger,  
 13a; Sternberg, 15  
 Bearpaw Mountains: Pepperberg, 10  
 Belly River horizon: Knowlton, 98e  
 Big Horn Mountains: Darton, 06e  
 Big Sandy field: Bowen (C F), 14b  
 Birch Creek-Sun River region: Stebinger, 18  
 Blackfeet Reservation: Stebinger, 14a, 17a  
 Boulder batholith: Billingsley, 15  
 Bowdoin dome: Collier, 17  
 Bozeman and Cinnabar fields: Weed, 91  
 Bull Mountain coal field: Lupton, 11; Rich-  
 ards (R W), 09; Woolsey, 17  
 Carbon Co.: Darton, 07a  
 Cascade Co.: Barnett, 16  
 Castle Mountain district: Weed, 96a  
 central: Bowen (C F), 15  
 Cleveland field: Bowen (C F), 14a  
 Culbertson field, Valley Co.: Beekly, 12  
 Crazy Mountains: Stone (R W), 09  
 Dillon quadrangle: Winchell (A N), 14  
 eastern: Calvert, 12; Leonard, 11; Rowe, 16  
 Electric coal field: Calvert, 12b  
 Elkhorn Mountains: Stone (R W), 11  
 Fort Benton beds: Douglass, 03  
 Fort Benton quadrangle: Weed, 99  
 Fort Peck Indian Reservation lignite field:  
 Smith (C D), 09b  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg fields: Pardee, 17  
 Great Falls region: Fisher (C A), 07, 09, 09a;  
 Weed, 92  
 Helena region: Knopf, 13  
 Hell Creek beds: Brown (B), 07  
 Iron Butte: Calvin, 89  
 Judith Mountains: Weed, 98  
 Judith River region: Hayden, 59a  
 Lake Basin field: Hancock, 17  
 Lewis and Livingston ranges: Willis, 02



## Cretaceous—Continued.

Montana: Lewiston field: Calvert, 09a  
 lignite area: Leonard, 06a  
 Little Belt Mountains: Weed, 99a  
 Little Rocky Mountains: Weed, 96b  
 Little Sheep Mountain field: Rogers (G S), 13  
 Livingston and Trail Creek fields: Calvert, 12a  
 Livingston formation: Stone (R W), 10  
 Livingston region: Iddings, 94; Weed, 93a  
 Milk River coal field: Pepperberg, 09a, 12  
 Musselshell Valley: Bowen (C F), 18c  
 Musselshell-Judith area: Bowen (C F), 14  
 north-central: Stebinger, 16a  
 northeastern: Collier, 18a  
 northern and central: Mortson, 76  
 northwestern: Stebinger, 14; Wood (H R), 92  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 13b  
 Rosebud Co.: Bowen (C F), 15a  
 south central: Douglass, 02a  
 southern: Dana (E S), 76  
 southwestern: Condit, 18; Douglass, 05a  
 Stillwater Basin: Calvert, 16  
 Sweetgrass Co.: Douglass, 09a  
 Terry lignite field, Custer Co.: Herald, 12  
 Teton Co.: Stebinger, 16  
 Three Forks region: Haynes, 16a; Peale, 96  
 Two Medicine formation: Stebinger, 17  
 Montana and Wyoming, correlation: Hares, 17a  
 Montana group: Stebinger, 14b  
 Morrison and Sundance formations, relations: Lee (W T), 17d  
 Morrison formation: Mook, 15, 16; Stanton, 05b  
 age: Berry, 15e; Darton, 05k; Knowlton, 16g; Lee (W T), 15b, 17d; Lull, 15a; Schuchert, 18a; Stanton, 15  
 Colorado: Lee (W T), 01  
 New Mexico: Darton, 15d  
 Nebraska: Aughey, 80; Barbour, 03; Egleston, 66c; Engelmann (H), 58; Hayden, 59, 62, 67; Meek, 58e, 59e, 65b; Pepperberg, 10  
 Cass Co.: Woodruff, 06  
 Dakota group: Gould, 00b, 01e; Hicks, 85a  
 eastern: Marcou, 67  
 Elk Point quadrangle: Todd, 08  
 Jefferson Co.: Carmony, 03  
 Laramie: Fisher (C A), 02  
 northeastern: Condra, 08  
 Republican River Valley: Condra, 07  
 Sioux City region: Burchard, 04  
 southeastern: Darton, 98  
 western: Darton, 99a, 03b  
 Nevada, Elko Co.: Schrader, 12  
 Yerington district: Knopf, 18a  
 New Jersey: Clark (W B), 93a, 94, 97e, 98; Conrad, 69; Cook (G H), 68, 83, 84, 85a; Credner, 70; Edwards (A M), 93a; Kümmel, 04, 09, 11b; Lea, 58a; Lewis, 15; Lyell, 44; Morton, 30, 32; Weller, 05a, e, 07; Whitfield, 87  
 Atlantic Highlands section: Prather, 05  
 Bordentown quadrangle: Shattuek, 95  
 Cliffwood: Berry, 04; Hollick, 96g, 97e, f  
 Cliffwood elays and Matawan: Knapp (G N), 04a  
 greensands: Clark (W B), 94a

## Cretaceous—Continued.

New Jersey: Marl belt: Britton (N L), 82b  
 Moorestown: Woolman, 93a  
 New York City district: Merrill (F J H), 02  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 sand hills region: Clark (W B), 97e  
 southern: Pierce, 23a  
 Timber Creek: Morton, 29e  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Marcou, 89f; Newberry, 61  
 Albuquerque region: Herrick, 00b  
 Carthage coal field: Gardner (J H), 10a  
 Cerrillos field, Santa Fe Co.: Lee (W T), 13a  
 Cerrillos Hills: Johnson (D W), 03  
 Dakotan series: Keyes, 06c  
 Deming quadrangle: Darton, 17  
 Estancia Valley: Meinzer, 11  
 Galisteo Creek: Stevenson, 79c  
 Gallina-Raton Spring coal field: Gardner (J H), 09  
 Gallup Basin: Kirk, 14  
 Gallup-San Mateo field: Gardner (J H), 09b  
 Jemez-Albuquerque region: Reagan, 03  
 Jornada del Muerto: Keyes, 05  
 Laramie group: Stevenson, 79b  
 Luna Co.: Darton, 16  
 Mount Taylor region: Shimer, 08a  
 Navajo country: Gregory (H E), 17  
 north central: Lee (W T), 12b  
 northeastern: St. John, 76  
 northern: Gardner (J H), 09a; Stevenson, 79, 81, 89  
 northwestern: Darton, 10a; Dutton, 85  
 Ojo Alamo beds: Brown (B), 10  
 Raton field: Lee (W T), 09a  
 Raton Mesa region: Knowlton, 13; Lee (W T), 17; Stevenson, 82a  
 Rio Grande Valley: Lee (W T), 07c  
 San Juan Co.: Bauer, 16; Knowlton, 16a  
 San Mateo-Cuba district: Gardner (J H), 10b  
 Sierra Blanca field: Wegeman, 14  
 Silver City quadrangle: Paige, 16  
 Socorro and Valencia eos.: Herrick, 00a  
 southeastern: Shumard (G G), 58a  
 southern: Stevenson, 81a  
 Tucumcari: Cummins, 93b; Hill (R T), 93b  
 Tularosa Basin: Meinzer, 15  
 western: Winchester, 14  
 New York: Hollick, 06  
 Long Island: Dana, 73g, 87d; Fuller, 03h, 14; Hitchcock (C H), 74f; Hollick, 93a, 94e, i, 95e, 96b, e; Martin (D S), 74a; Newberry, 74s; Pollard, 94; Veatch (A C), 06e, d; Northport: Ries, 94  
 Passaic quadrangle: Darton, 08b  
 Richmond Co.: Britton (N L), 81a  
 southeastern: Berkey, 11  
 Staten Island: Britton (N L), 85, 85a, 89, 89b; Gratacap, 00b; Hollick, 89b, 92b; Yellow Gravel formation: Britton (N L), 89a  
 Niobrara chalk: Calvin, 94b  
 Niobrara group: Sternberg, 81e  
 North America: Willis, 12; southern: Stanton, 18  
 North Carolina: Conrad, 71a; Kerr, 75; Stephenson, 07, 09



## Cretaceous—Continued.

- North Carolina: Coastal Plain: Clark (W B), 12; Stephenson, 12a  
 Wilmington: Stanton, 91  
 North Dakota: Leonard, 04a, 06d, 13, 16b, 17; Wilder, 02b, c; Willard, 04b, 06  
 Bismarck quadrangle: Leonard, 12  
 Cannonball River lignite field: Lloyd, 14  
 Devils Lake region: Babcock, 02  
 Laramie and Fort Union beds: Wilder, 04b  
 lignite area: Leonard, 03a  
 northeastern: Barry, 08  
 Sentinel Butte region: White (C A), 83n  
 south central: Leonard, 12b  
 volcanic ash bed: Stanton, 17  
 western: Leonard, 11; Lloyd, 15  
 Northwest Territory, Great Slave Lake region: Cameron, 18  
 Oklahoma: Gould, 02, 05; Shannon, 15  
 Arbuckle Mountains: Taff, 04  
 Atoka quadrangle: Taff, 02  
 Madill oil pool: Taff, 09c  
 Red River region: Hill (R T), 94  
 southern: Hutchison, 11; Stephenson, 18  
 Tishomingo quadrangle: Taff, 03  
 Trinity beds: Larkin, 10  
 Oregon: Becker, 91b; Diller, 08  
 Cascades: Smith (W D), 17  
 Coos Bay quadrangle: Diller, 01  
 Curry Co.: Butler (G M), 16  
 eastern: Washburne, 03  
 John Day Basin: Merriam, 01a  
 Klamath Mountains: Anderson (F M), 02a  
 northwestern: Diller, 96  
 Port Orford quadrangle: Diller, 03  
 Rogue River Valley: Anderson (F M), 95  
 Roseburg quadrangle: Diller, 98  
 southern: Diller, 93  
 southwestern: Diller, 07, 14a; Louderback, 05; Winchell (A N), 14a  
 Pacific coast: Anderson (F M), 02  
 Paleogeographic map: Willis, 09  
 Platte series, Great Plains: Cragin, 96b  
 Porto Rico, Coamo-Guayama region: Hodge (E T), 17; San Juan district: Semmes, 17  
 Post-Laramie deposits, Colo.: Cross, 92  
 Potomac beds: Fontaine, 89; McGee, 88a; Ward (L F), 95, 96, 96a  
 age: Gilbert, 96c; Ward (L F), 88, 97b  
 Virginia: Fontaine, 88, 96  
 Potomac group: Clark (W B), 97d, 02b; age: Berry, 15c; correlation: Berry, 11b  
 Puerco and Laramie deposits, relations: Cope, 85u  
 Raritan formation, age: Berry, 10j  
 Ripley group, Ala. and Miss.: Johnson (L C), 84  
 Rocky Mountain region: Dana (J D), 90f; Hayden, 61, 68c; Lee (W T), 14, 15a; Meek, 74c; Storrs, 02  
 Santo Domingo: Gabb, 73  
 Saskatchewan: Dawson (J W), 88d; Hind, 59; McInnes, 13a; Malcolm, 13  
 Cypress Hills-Wood Mountain region: McConnell, 85  
 Lac La Ronge district: McInnes, 10  
 southern: Davis (N B), 18  
 Wood Mountain-Willowbunch area: Rose, 16

## Cretaceous—Continued.

- Sedimentary measurement: Gilbert, 95c  
 Shoshone group: Cross, 09  
 South Carolina: Berry, 14; Sloan, 04, 07, 08; Tuomey, 48  
 Charleston: Stephenson, 14a; Vogdes, 78a  
 Coastal Plain: Darton, 96f  
 South Dakota: Darton, 09a; Hayden, 62; Meek, 56; Nicollet, 43a; Todd, 95, 98, 10  
 Aberdeen-Redfield district: Todd, 09  
 Alexandria quadrangle: Todd, 03c  
 Belle Fourche quadrangle: Darton, 09e  
 Black Hills: Calvin, 94; Carpenter (F R), 88; Darton, 01a, 04c, 09, 18; Newton, 80; Stone (R W), 12; Ward (L F) 94, 99; Winchell (N H), 75  
 Cheyenne River Indian Reservation: Calvert, 14  
 De Smet quadrangle: Todd, 04a  
 eastern, Benton formation: Todd, 04c  
 Edgemont quadrangle: Darton, 04a  
 Elk Point quadrangle: Todd, 08  
 Great Sioux Reservation: Willis, 85  
 Huron quadrangle: Todd, 04  
 James River valley: Todd, 04b  
 Lincoln Co.: Bendrat, 04  
 Mitchell quadrangle: Todd, 03b  
 northwestern: Winchester, 16  
 Oelrichs quadrangle: Darton, 02a  
 Olivet quadrangle: Todd, 03  
 Parker quadrangle: Todd, 03a  
 Rosebud Reservation: Perisho, 10; Reagan, 05  
 south central: Perisho, 12  
 southeastern: Todd, 00  
 Standing Rock Indian Reservation: Calvert, 14  
 western: Lloyd, 15  
 White River region: Hayden, 57a  
 Southwest: Hill (R T), 91b; White (C A), 89c  
 Tennessee: Berry, 16f; Glenn, 06; Safford, 56, 69  
 McNairy Co.: Wade, 17  
 Perry Co.: Wade (B), 14  
 Waynesboro quadrangle: Drake, 14; Miser, 17a  
 western: Nelson (W A), 11; Safford, 64  
 Texas: Blake (W P), 56, 56a; Buckley, 74; Cope, 87f; Cragin, 97b; Dumble, 90, 15a; Harris, 09; Hill (R T), 87b, 88d, 89, 89a, b, d, e, i, 90, 90e, 97a, 98; Marcou, 55a, b, 61, 90b, 94, 97a; Roemer, 46, 48, 52; Shumard (B F), 60, 60g, 63b, c; Shumard (G G), 86; Taff, 93a; Tarr, 92a; Udden, 16a; White (C A), 87d  
 Austin chalk: Prather, 02  
 Austin quadrangle: Hill (R T), 02  
 Black and Grand prairies: Hill (R T), 01  
 Brewster Co.: Dumble, 02b; Hill (B F), 02  
 Buda limestone: Shattuck, 03  
 Camp Bowie area: Shuler, 17  
 central: Cummins, 90; Taff, 92  
 chalk formations: Gordon (C H), 09; Hill (R T), 09  
 Chisos country: Udden, 07a  
 Choctaw and Grayson terranes: Cragin, 94a  
 coastal area: Dumble, 15c  
 Colorado coal field: Drake, 93, 17



## Cretaceous—Continued.

Texas: Comanche series: Hill (R T), 91  
 Concho country: Cummins, 90b  
 Corsicana field: Matson, 17b  
 Dallas Co.: Shuler, 18  
 Dallas region: Matson, 16c  
 Double Mountains: Dumble, 92d  
 Edwards Plateau: Hill (R T), 98b  
 El Paso region: Richardson (G B), 09;  
 Stanton, 96a; Taff, 91  
 Kaufman Co.—Sabine Pass: Kennedy, 92b  
 Kent section: Dumble, 93b  
 La Salle and McMullen cos.: Deussen, 16  
 Llano and Burnet quadrangles: Paige, 12  
 Llano Estacado: Cummins, 92a; northern:  
 Baker (C L), 15  
 Malone district: Cragin, 05  
 Maverick Co.: Udden, 08a  
 Mitchell Co.: Broadhead, 88  
 Neuces quadrangle: Hill (R T), 98a  
 north of Colorado River: Taff, 92a, 93  
 northeastern: Gordon (C H), 09, 11; Stephen-  
 son, 18  
 northern: Hill (R T), 87a  
 northwestern: Cummins, 93  
 Palestine salt dome: Hopkins (O B), 17  
 Panhandle: Gould, 07  
 Pilot Knob: Hill (R T), 90f  
 Presidio Co.: Dumble, 02b; Shafter district:  
 Udden, 04  
 Red River region: Hill (R T), 94  
 Rio Grande embayment: Udden, 07  
 Rio Grande region: Dumble, 92c; Hill (R T),  
 98b; Schott, 55; Vaughan, 00b  
 Runnels Co.: Beede, 18  
 San Antonio area: Muir (A H), 11  
 Terlingua district: Phillips, 06; Turner, 05  
 Terrell Co.: Christner, 18  
 Thrall oil field: Udden, 16b  
 trans-Pecos: Richardson (G B), 04; Streer-  
 witz, 93  
 trans-Pecos front range: Baker (C L), 17  
 Uvalde quadrangle: Vaughan, 00  
 Val Verde Co.: Roberts (J R), 18  
 Van Horn quadrangle: Richardson (G B), 14  
 western: Dumble, 95; Kimball, 69  
 Wichita region: Gordon (C H), 13  
 Wise Co.: Böse, 17  
 Texas section: White (C A), 89c  
 Trinidad: Wall, 60  
 Tuscaloosa formation: Smith (E A), 92e;  
 Wade, 17a; delta character: Berry, 17d  
 United States, eastern: Rogers (H D), 35  
 Upper Cretaceous, variations in stratigraphy:  
 Stanton, 13  
 Utah: Engelmann (H), 58a; Meek, 60a, 73  
 Book Cliffs region: Richardson (G B), 09b  
 Castle Valley: Lupton, 16a  
 Coalville field: Wegemann, 15  
 Deep Creek district, Uintah Co.: Lupton, 12  
 eastern: Cross, 07; Forrester, 18  
 Green River field: Emery, 18a; Lupton, 14  
 high plateaus: Dutton, 80  
 northeastern: Gale, 09, 10; White (C A), 89  
 Pleasant Valley district: Taff, 07a  
 Sanpete and Sevier valleys: Richardson  
 (G B), 07

## Cretaceous—Continued.

Utah: Southern: Leith, 08a; Richardson (G B),  
 09a  
 Uinta Mountains: Powell, 76; Weeks, 07  
 Virginia: Clark (W B), 07; Heinrich, 79a  
 Coastal Plain: Berry, 12; Clark (W B), 06d,  
 12b; Sanford, 13  
 Fredericksburg quadrangle: Darton, 94d  
 Norfolk: Darton, 98d  
 Potomac formation: Fontaine, 96  
 Washington quadrangles: Darton, 01  
 Washington: Landes, 02a  
 Cascade Mountains: Russell, 00; Smith (G O),  
 04b  
 Olympic Peninsula: Arnold, 06a; Reagan, 09  
 western: Weaver, 16  
 Western States: Hayden, 76  
 West Indies, northeastern: Cleve, 82  
 Wyoming: Cope, 72q, 73x; Darton, 08; Hay-  
 den, 68, 68b, 69c; Knight (W C), 00; Marsh,  
 73e; Trumbull, 05, 17; Veatch (A C), 07  
 Absaroka quadrangle: Hague, 99b  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles:  
 Darton, 06c  
 Big Horn Basin: Fisher (C A), 06; Hewett,  
 17; Lupton, 16, 16c; Washburne, 09;  
 Woodruff, 09a, 10  
 Big Horn Co.: Hintze, 15  
 Big Horn Mountains: Darton, 04c, 06e  
 Big Muddy dome: Barnett, 14b  
 Bitter Creek coal series: Cope, 73l  
 Black Hills region: Darton, 09; Stone (R W),  
 12  
 Buffalo coal field: Gale, 10d  
 Byron field: Ziegler, 17  
 Carbon Co.: Veatch (A C), 07a  
 central: Hares, 15, 16  
 Cloud Peak and Fort McKinney quadrangles:  
 Darton, 06d  
 Converse Co., Ceratops beds: Hatcher, 93  
 Devils Tower quadrangle: Darton, 07b  
 Douglas oil field, Converse Co.: Barnett, 14;  
 Jamison, 12  
 Fremont Co.: Jamison, 11a  
 Frontier formation: Knowlton, 17a  
 Glenrock coal field: Shaw (E W), 09  
 Grass Creek field: Hintze, 15b  
 Great Divide Basin coal field: Smith (E E),  
 09  
 Green River district: Peale, 79  
 Hanna Basin: Bowen (C F), 16, 18  
 Hartville quadrangle: Smith (W S T), 03  
 Hay Creek coal field: Jenney, 99  
 Laramie and Sherman quadrangles: Darton,  
 10c  
 Laramie Basin: Darton, 09f  
 Laramie Mountains: Darton, 16a  
 Lander oil field: Woodruff, 07, 11  
 Lincoln Co.: Schultz, 14  
 Little Buffalo Basin field: Hintze, 15a  
 Little Snake River coal field: Ball (M W),  
 09, 10  
 Moorcroft field: Barnett, 14a  
 Muddy Creek oil field, Carbon Co.: Jamison,  
 12  
 Newcastle quadrangle: Darton, 04



## Cretaceous—Continued.

- Wyoming: Niobrara Co.: Lull, 15c  
 North Laramie Mountains: Spencer (A C), 16  
 northwestern: Eldridge, 94a  
 Oregon Basin field: Ziegler, 17a  
 Owl Creek Mountains: Darton, 06  
 Park Co.: Moody, 18  
 Patrick and Goshen Hole quadrangles:  
 Adams (G I), 02  
 Powder River Basin: Wegemann, 12, 17  
 Salt Creek oil field, Natrona Co.: Jamison, 12a;  
 Trumbull, 14a; Wegemann, 11, 18  
 Shoshone River section: Hewett, 14b  
 southern: Heroy, 15  
 Sundance quadrangle: Darton, 05a  
 Sussex coal field: Wegemann, 12a  
 Sweetwater Co.: Schultz, 09; Rock Springs  
 coal field: Schultz, 10  
 Sweetwater district: Endlich, 79  
 Uinta Co.: Schultz, 07b; Veatch (A C), 06f  
 western: Comstock, 74; Schultz, 18  
 Wind River region: Endlich, 79; Woodruff,  
 12c; Ziegler, 16  
 Wyoming-Idaho border: Breger, 10  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yellowstone National Park: Hague, 99; Weed,  
 96  
 Yukon: Cairnes, 08a  
 Orange group: Cairnes, 12e  
 Lewes and Nordenskiöld rivers area: Cairnes,  
 10a  
 Wheaton River district: Cairnes, 10, 11a, 12  
 Cretaceous-Tertiary boundary: Osborn, 14; Rocky  
 Mountain region: Knowlton, 14a  
 Crinoid skeletons, composition: Clarke (F W), 14c  
 Crinoidea. *See also* Echinodermata.  
 Acrocrinus, Grayson Co., Ky.: Yandell, 55  
 Actinocrinidae, genesis: Keyes, 90c  
 Actinocrinus: Billings, 74c; Indiana: Whit-  
 field, 00b  
 Agaricocrinus, development: Klem, 00; Keo-  
 kuk: Gordon (C H), 90  
 Allocrinus, Niagara group: Wachsmuth, 90a  
 American Paleozoic, classification: Miller (S  
 A), 90a  
 Arthroacantha, ithacensis: Williams (H S)  
 84b  
 Astroporites, Hull, Quebec: Lambe, 96  
 Atactocrinus, Richmond, Ill.: Weller, 16  
 Ataxiocrinus (Anomalocrinus): Lyon, 69  
 Baryocrinus hoveyi, Crawfordsville, Ind.: Whit-  
 field, 04a  
 Basal plate evolution in monocyclic Camerata:  
 Wilson (H E), 16  
 Batocrinus: Casheday, 54  
 Batocrinus calvini, Burlington limestone, Mo.:  
 Rowley, 90  
 Belemnocrinus: Wachsmuth, 77; White (C A),  
 66  
 Biserial arm: Grabau, 03b  
 Botryocrinus: Bather, 06  
 Bourguetierinus, Ripley group, Ala.: De  
 Loriol, 82  
 Brachiocrinus: Bather, 95  
 Burlington limestone: Niles, 66; Rowley 90a  
 Cactocrinus: Wood (Elvira), 14  
 Calceocrinidae: Ringueberg, 89

## Crinoidea—Continued.

- Callicrinus: Weller, 97c  
 Camarocrinus: Cockerell, 18a; Hall, 79a;  
 Schuchert, 03d, 04a; Springer, 17  
 Camerata: Wachsmuth, 97  
 Camerate crinoids, Niagara group: Wachsmuth,  
 92; parasitism: Moodie, 18c  
 Canada, Ordovician: Billings, 59  
 Carboniferous: McChesney, 67; Meek, 68e;  
 Miller (S A), 90b  
 Illinois: Wachsmuth, 82  
 Illinois and Iowa: Worthen, 82  
 Kansas: Beede, 00a; White (C A), 80  
 Mississippi Valley: Hall, 61d, e; Meek, 61b;  
 Miller (S A), 96a, b  
 Caryocrinites, Lockport, N. Y.: Say, 25  
 Cheiocrinus: Hall, 60f  
 Chester group, Pulaski Co., Ky.: Miller (S A),  
 79b; Wetherby, 79b  
 Cincinnati: James (J F), 91; Meek, 72c; Mil-  
 ler (S A), 79c, 81b, 82b; Ulrich, 82a;  
 Wetherby, 80; Glyptocrinus: James  
 (U P), 85  
 Classification: Bather, 98; Chapman, 83; Paleo-  
 zoic: Miller (S A), 89a  
 Cleiocrinus: Springer, 05  
 Column, primitive structure: Sardeson, 99c  
 Columns and roots: Dyche, 92a  
 Crawfordsville crinoid beds: Beachler, 87  
 Cremacrinidae: Ulrich, 86b, 13b  
 Crotalocrinus: Wachsmuth, 89a; Weller, 02a  
 Cryptodiscus: Weller, 97c  
 Descriptions: Shumard (B F), 57; Springer,  
 11a; Wachsmuth, 78  
 Devonian: Rowley, 06; Wood (Elvira), 04  
 Indiana: Miller (S A), 96a  
 Kentucky and Indiana: Miller (S A), 94  
 Montana: Raymond (P E), 12b  
 New York: Clarke (J M), 10  
 Wisconsin: Weller, 98a  
 Discoid crinoidal roots and Camarocrinus: Sar-  
 deson, 08b  
 Dorycrinus: Roemer, 53  
 Embryo crinoid, structural features: Hudson,  
 17a  
 Embryocrinus problematicus: Hudson, 18a  
 Erisocrinus: Meek, 65b, c  
 Eucalyptocrinus, Niagaran, Illinois: Miller  
 (S A), 89e  
 Fistulate crinoids, pores in ventral sac: Bather,  
 00; Springer, 00  
 General: Keyes, 96n; Meek, 74a; Wachsmuth,  
 78; White (C A), 87a; Yandell, 51  
 Gennaeocrinus, Indiana: Wood (Elvira), 01a  
 Gilbertsocrinus: Meek, 65i  
 Glyptocrinus: Miller (S A), 83, 83a; Wachsmuth,  
 83b  
 Hamilton, Missouri: Rowley, 94  
 Helderbergian: Hall, 79a; Talbot, 05  
 Herpetocrinus: Bather, 95  
 Homocrinus: Kirk, 14  
 Hybocrinus, Hoplocrinus and Baerocrinus  
 Wachsmuth, 83c  
 Hybocystis in Ontario: Parks, 08b  
 Hydreionocrinus, Coal Measures, Kansas:  
 Weller, 98b  
 Hypsocrinus: Springer, 06a



## Crinoidea—Continued.

- Hystriocrinus, Hamilton group, Ontario: Hinde, 85
- Illinois, Carboniferous: Meek, 73a; Wachsmuth, 83; Worthen, 83a; Chicago area, Niagara: Weller, 00c
- Indiana: Lyon, 61a, 62
- Cincinnati series: Cumings, 08
- Crawfordsville: Bassett, 85; Beachler, 87; Braun, 73; Hovey (E O), 67
- Niagara: Beachler, 89a
- Subcarboniferous: Lyon, 60
- Internal convoluted plate: Hall, 65b
- Iowa, Burlington, Carboniferous: White (C A), 63
- Kinderhook beds: Wachsmuth, 90
- Mississippian: Hall, 59j
- Monticello: Thomas (A O), 15
- Isocrinus, Triassic, Alaska: Bather, 18
- Jurassic: Springer, 09
- Kentucky: Lyon, 61a, 62
- Louisville area: Lyon, 69
- Pulaski Co.: Wetherby, 81
- Subcarboniferous: Lyon, 60
- Knobstone formation fauna: Springer, 11
- Lichenocrinus: Meek, 71c, 72b, c
- Marsupites, systematic position: Clark (A H), 11
- Maryland, Devonian: Ohern, 13a
- Megistocrinus, Michigan: Wachsmuth, 84
- Merocrinus: Bather, 13
- Michigan, Alpena: Barris, 84a
- Mississippi Valley, Carboniferous: Meek 60d, 65g, h
- Mississippian: Keyes, 89e; Lyon, 59; McChesney, 59; Meek, 69a, c; Miller (S A), 80a, 91, 94a, 95, 95a, 96, 97; Rowley, 06
- Iowa: Owen (D D), 50, 52b; and Illinois: Owen (D D), 52c
- Kentucky: Wetherby, 80, 80b
- Missouri, Devonian and Mississippian: Rowley, 93b, 00, 05
- Kansas City, Aesiocrinus: Butts (E), 91a; Carboniferous: Butts (E), 98
- Mississippian: Miller (S A), 91; Rowley, 02
- Morphology: Wachsmuth, 87; and classification: Wachsmuth, 89
- Motion of crinoid stems: Foerste, 84
- Mysticocrinus, Silurian, Indiana: Springer, 18
- New York, Chemung: Williams (H S), 82a
- Devonian: Hall, 62c; Olsson, 12a
- Lockport shales: Ringueberg, 82a
- Portage: Whitfield, 05
- Schoharie: Silliman, 36
- Trenton fossils: Walcott, 84b
- Niagaran, Illinois: Miller (S A), 81c; New York: Ringueberg, 90
- Ohio, Cincinnati: Anthony, 39
- Devonian: Hall, 75b
- Waverly: Hall, 64, 75c
- Ontario, Trenton: Billings, 56c; Billings (W R), 85, 87; Kirkfield: Springer, 11b
- Onychocrinus: Springer, 06
- Ottawacrinus: Bather, 13
- Paleocrinoidea: Wachsmuth, 80
- Paleozoic: Miller (S A), 82b
- Pelmatozoa, eleutherozoic: Kirk, 11

## Crinoidea—Continued.

- Periglyptocrinus priscus, ornamentation: Parks, 09a
- Perisomic plates: Keyes, 91b; Wachsmuth, 91
- Permian crinoid fauna, Texas: Weller, 09b
- Petalocrinus: Bather, 98a; Weller, 96
- Phylogenetic studies: Wood (Elvira), 14
- Platycceras, attachment to crinoids: Keyes, 88f
- Platyocrinus: Worthen, 60
- Plicatocrinidae, systematic position: Clark (A H), 13b
- Porocrinus: Hudson, 15
- Porocrinus smithi, Belleville, Ont.: Grant (J), 81
- Portage: Clarke (J M), 05e
- Poteriocrinus, Burlington: Whitfield, 81
- Pterotocrinus: Wetherby, 79a
- Quebec, Grand Greve, Devonian: Clarke (J M), 09a
- Reproduction of arms: Foerste, 93e; of lost parts: Whitfield, 04a
- Reteocrinus: Miller (S A), 83a; Wachsmuth, 83b
- Roots of Ordovician crinoids: Dyche, 92, 92b
- Sagenocrinus: Springer, 02
- Scyphocrinus: Springer, 17; and Camarocrinus: Springer (F), 13
- Scyphocrinus slab: Bassler, 13a
- Silicate injection: Hunt, 71c
- Silurian, Chicago area: Slocum, 07a
- Siphonocrinus, Niagara group: Miller (S A), 88a
- Skeletons, composition: Clarke (F W), 14c
- Sphaeroidocrinidae: Wachsmuth, 80
- Stereocrinus: Barris, 84b
- Strophocrinus: Sardeson, 99
- Structure, Paleozoic: Billings, 69b; Wachsmuth, 77a; and habits: Meek, 69
- Taxocrinus: Meek, 65f
- Tennessee: Troost, 50
- Thayer shales: Keyes, 01h
- Troost's crinoids of Tennessee: Glenn, 10; Wood (Elvira), 09
- Uinacrinus: Bather, 96; Clark (A H), 11; Grinnell, 76a; Hovey, 02c; Keyes, 96q; Martin (H T), 07; Springer, 99, 00a, 01
- Cretaceous, British Columbia: Whiteaves, 04c
- Kansas: Beecher, 00; Hill (B H), 94; Meek, 76c; Schuchert, 04; Williston, 94c
- Uinacrinus socialis: Bassler, 09c
- Cripple Creek district. *See* Colorado.
- Cripple Creek gold area, Ont.: Bruce, 12a
- Cristobalite and tridymite, melting points: Ferguson (J B), 18
- Crocodiles. *See* Reptilia.
- Cross of Hawaii: Jaggar, 13
- Cross-bedding: Davis (W M), 90; Grabau, 07d; Kindle, 11c; White River formation, S. Dak.: Winchester, 13
- Crotalocrinus: Wachsmuth, 89a
- Crowley's Ridge, geographic development: Marbut, 95
- Crows Nest coal field: Ainsworth, 05; Leach, 02
- Crows Nest volcanics: Mackenzie, 14b
- Crustacea. *See also* Cirripedia; Ostracoda; Trilobita.
- Acanthotelson stimpsoni, uropods, Mazon Creek: Cockerell, 16b



## Crustacea—Continued.

- Aglaspis, Potsdam sandstone, Wis.: Hall, 62n  
 Anomalocaris, Mount Stephen, B. C.: Whiteaves, 92b  
 Anthracaridae: Packard (A S), 86b  
 Apodidae: Schuchert, 97a  
 Astacus, Tertiary, Idaho: Cope, 71i  
 Balanidae, phylogeny: Ruedemann, 18a  
 Balanus, Eocene, South Carolina: Holmes (F S), 56  
 Bellinurus, Coal Measures, Illinois: Meek, 67b;  
 Nova Scotia: Ami, 99f; Jones, (T R), 99  
 Beyrichiidae, revision: Ulrich, 08  
 Bibliography: Vogdes, 95; Paleozoic: Vogdes, 90, 17  
 Brachyura (crabs), California: Rathbun, 08, 17a  
 Hudson River tunnel: Whitfield, 91a  
 Nantucket Island, Mass.: Cushman, 05;  
 Packard, 00a; Stimpson, 63  
 South Dakota, Cretaceous: Rathbun, 17  
 Branchioplax, Port Townsend, Wash.: Rathbun, 16  
 Calappa, Miocene, Panama: Bouvier, 99  
 Cambrian, British Columbia: Walcott, 10  
 New Brunswick: Matthew (G F), 06b  
 Carcinoma, Kokomo, Ind.: Claypole, 94  
 Catalog, Paleozoic (non-trilobitic): Vogdes, 89  
 Climaticnites, tracks: Hitchcock (C H), 08c  
 Coal Measures, Pawtucket, R. I.: Haynes, 13  
 Crangopsis: Ortmann, 97  
 Crayfish, Tertiary: Packard (A S), 80, 81, 81b  
 Cretaceous: White (C A), 81e; Vancouver Island: Woodward (H), 95, 96, 00  
 Cryptozoe problematicus: Packard (A S), 86g  
 Cyclus, Coal Measures, Kansas: Rogers (A F) 02  
 Decapod crustacean, Cretaceous, Highwood River, Alta.: Whiteaves, 85a  
 Decapoda, Panama Canal Zone: Rathbun, 18  
 Devonian: Clarke (J M), 07a; Hall, 89  
 New York: Clarke (J M), 83  
 Ohio: Whitfield, 80b  
 Wisconsin: Cleland, 11  
 Dithyrocaris? belli, Gaspé: Woodward (H), 71  
 Dolichocephala laeoana, Wyoming Co.: Claypole, 84d  
 Echinocaris: Whitfield, 80b  
 Enoploura, Cincinnati: Wetherby, 79  
 Estheria, Leda clays, Ontario: Packard (A S), 81a  
 Estheriae, Kansas: Jones (T R), 98  
 Euproops: Meek, 67c  
 Eusarcus scorpionis, Buffalo, N. Y.: Grote, 75, 75a  
 Gampsonychidae: Packard (A S), 86a  
 General: Clarke (J M), 92b  
 Graptocarcinus, Cretaceous, Texas: Roemer, 87a  
 Guadalupian fauna: Girty, 08  
 Hoploparia, Cretaceous, Montana: Whitfield, 07  
 Lepadidae, derivation: Clarke (J M), 18e  
 Linuparus, Cretaceous, South Dakota: Ortmann, 97a  
 Linuparus and Podocrates: Ortmann, 01  
 Merostomata, middle Cambrian: Walcott, 10  
 New Brunswick, Devonian: Salter, 63  
 Little River group: Matthew (G F), 10c  
 southern: Matthew (G F), 89b

## Crustacea—Continued.

- New Jersey: Van Rensselaer, 25a  
 Cretaceous: Pilsbry, 01  
 Miocene: Whitfield, 94  
 New York, Chemung: Clarke (J M), 97a  
 Devonian: Hall, 63f, 88  
 Devonian phyllopods: Clarke (J M), 82  
 eurypterid fauna: Sarle, 03  
 Nova Scotia, Carboniferous: Dawson (J W), 77g; Salter, 63  
 Palaeopalaemon: Whitfield, 80b  
 iowensis, Kinderhook shale, Burlington: Walter, 17  
 newberryi, Iowa: Whitfield, 92b  
 Paleozoic, bibliography: Vogdes, 93  
 Panama, Gatun fauna: Brown (A P), 11a  
 Paradoxides beds faunas: Matthews (G F), 96a  
 Pennsylvania, Catskill group: Claypole, 83e  
 Phyllocarida, lamellate thoracic feet: Packard (A S), 86e  
 New York: Clarke (J M), 02a  
 Pennsylvania: Beecher, 02b  
 Pleistocene, Maryland: Clark (W B), 06b  
 Podostomata: Packard (A S), 86f  
 Pollicipes and Scalpellum, geologic distribution: Bather, 01  
 Prestwichia, Pennsylvania: Williams (H S), 85  
 Pseudoniscus, New York: Clarke (J M), 02a  
 Pterygotus, Buffalo, N. Y.: Grote, 75a, 78  
 Ranina, Tertiary, Trinidad: Woodward (H), 66  
 Rhachura: Scudder, 78e  
 Rhinocaris, Devonian, New York: Clarke (J M), 93c  
 Spheroma, Mexico: Bárcena, 75d  
 Spheroma bumastiformis: Eights, 42  
 Stylonurus, Catskill group: Hall, 83f; Martin (D S), 82  
 Syncarida: Cockerell, 16b; Carboniferous: Packard (A S), 85a, 86  
 Trails: Packard, 00b  
 Trinidad, crab: Guppy, 09b  
 Virginia, Yorktown: Van Rensselaer, 25a  
 Waterlime fauna, Buffalo, N. Y.: Pohlman, 81, 82, 86  
 Xiphosura, Carboniferous: Packard (A S), 85  
 Cryolite.  
 General: Hovey, 06l; Pratt, 02b  
 Greenland, Ivigtut: Baldauf, 10; Bernard, 16; Burchard, 07b; Canby, 97; De Rance, 75; Halland, 11; Steenstrup, 10; Ussing, 08  
 Cryptodiscus: Weller, 97c  
 Cryptogams. See Paleobotany.  
 Cryptolithus tessellatus, Cincinnati: Locke, 42  
 Cryptophragmus: Raymond (P E), 14b  
 Cryptozoon: Dawson (J W), 97b; Hall, 83g; Rothpletz, 15; Schuchert, 15c; Seely, 08a; Wisconsin: Winchell (N H), 94b; Minnesota, Northfield: Chaney, 92  
 Crystal Falls district, Mich.: Clements, 99; Van Hise, 01  
 Crystalline limestones: Hunt, 54b  
 Crystalline rocks: Winchell (N H), 94b; decomposition: Hunt, 74f; genetic history: Hunt, 87a; northern California and southern Oregon: Dutton, 91; origin: Hunt, 71a, 72c, 78b, 86



**Crystalline schists:** Hunt, 88; Powell, 91b; Coast Ranges: Becker, 91c; Lake Superior district: Irving, 91

**Crystallization, order in igneous rocks:** Bowen (N L), 12b

**Crystallography.**

- Alamosite, Mexico: Palache, 09b
- Albite: Dreyer, 10; Grosspietsch, 08
- Anglesite, Tintic district, Utah: Kraus, 16
- Apatite crystal, Alexander Co., N. C.: Prindle, 94; Auburn: Ford (W E), 17a
- Apparatus and methods: Moses, 97b
- Arizonite: Palmer (C), 09
- Artificial lava flow: Pirsson, 10
- Axinite, California: Schaller, 10e
- Benitoite: Baumhauer, 09; Hlawatsch, 09, 09a, 09b; Louderback, 07, 09; Palache, 09
- Borderland between crystallography and chemistry: Goldschmidt, 04
- Britholite, Greenland: Böggild, 11
- Brochantite: Zambonini, 01
- Brookite, New York: Whitlock, 10a
- Calamine, Mexico: Seebach, 12; Organ Mountains, N. Mex.: Ford (W E), 09c
- Calcite: Palache, 98; Pogue, 09; Schaller, 09
- Joplin, Mo.: Farrington, 00a
- Kelly's Island: Ford (W E), 09b
- New Jersey trap region: Rogers (A F), 02b; Whitlock, 09
- New York: Whitlock, 10
- California, Rincon pegmatite veins: Rogers (A F), 10b
- Calomel, Texas: Goldschmidt, 08
- Cerussite, British Columbia: Ledoux, 18a; Thomson, 18a; Mexico: Hunt (W F), 11
- Chalcophyllite: Palache, 09c
- Chrysoberyl and pyroxene: Whitlock, 12
- Classification of crystals: Swartz, 09; Wherry, 18b
- Colemanite, California: Eakle, 02; Jackson (A W), 85
- Color scheme for crystal models: Chadwick, 12
- Compound or twin crystals: Dana (J D), 36
- Connellite: Palache, 09c
- Copper: Dana (E S), 86f; Lake Superior: Rath, 78
- Cryolite group: Böggild, 12, 12a
- Crystal class arrangement: Rogers (A F), 01b
- Crystal classes, tables for determining: Smith (W S T), 10
- Crystal drawing: Penfield, 05; and modeling: Blake (J M), 17a
- Crystal forces: Wright (F E), 16a
- Crystal forms of minerals, new: Whitlock, 10c
- Crystal habit, exact expression: Rogers (A F), 04
- Crystal problems, solution: Blake (J M), 18
- Crystal zones, plotting on paper: Blake (J M), 16
- Crystallographic notes: Whitlock, 10b
- Crystallographic systems: Todd, 10a
- Crystallographic tables: Bowles, 12; Wherry, 12; Whitlock, 12a
- Crystals, characters: Moses, 99
- Cuprodescloizite: Guild, 11
- Datolite, New Jersey: Ford (W E), 09b
- Delafossite: Rogers (A F), 13
- Determination of angles and indices: Moses, 02

## Crystallography—Continued.

- Diagrams of crystals: Egleston, 66
- Drawing figures: Dana (J D), 37c
- Elements: Williams (G H), 90a
- Epidote, Huntington, Mass.: Forbes, 96
- Eremite: Dana (J D), 37d
- Etching figures of the dihexagonal alternating type: Honess, 18
- Ferberite: Hess, 14
- Fluorite, New York: Whitlock, 10a
- General: Ferrier, 95; Hensoldt, 90; Moses, 97, 97a; Patton, 96; Rogers (A F), 02a; Troost, 21a; Wadsworth, 09; Wintringham, 17
- Geometrical crystallography: Butler (G M), 18, 18a
- Geothite, Nova Scotia: Goldschmidt, 10
- Gold: Dana (E S), 86b
- Graduated sphere for crystal optics: Warren (C H), 16
- Graphical methods: Penfield, 02; Rogers (A F), 02c, 03
- Graphite, rhombic crystallization: Martin (D S), 74b
- Greenland minerals: Böggild, 05
- Growing crystals, linear force: Becker, 05b, 16a; Hostetter, 17
- Growing crystals for measurement: Blake (J M), 15
- Growth of crystals: Taber, 16c
- Gypsum: Kraus, 12; New York: Whitlock, 10a
- Gyrolite: Böggild, 08
- Hastingsite, Ontario: Graham (R P D), 09b
- Heat conductivity of crystals: Clark (R W), 12
- Herderite, Maine: Ford (W E), 11, 12a
- Hinsdalite, Colorado: Larsen, 11a
- Hodgkinsonite, Franklin Furnace, N. J.: Palache, 13
- Hopeite: Walker, 18
- Iodyrite: Kraus, 09
- Labradorite: Ford (W E), 10a; from gabbro, Minnesota: Winchell (N H), 96f
- Lead silicates: Kraus, 12a
- Leadhillite: Palache, 09a, 10a, b
- Lecture notes: Patton, 96
- Linarite, British Columbia: Johnston (R A A), 08
- Linear force of growing crystals: Becker, 05b, 16a; Hostetter, 17
- Lithiophilite: Penfield, 95
- Magnetite, New York: Whitlock, 10a
- Mammoth Cave, crystal growths: Call, 00
- Mercury minerals, Terlingua, Tex.: Hillebrand, 09
- Metacinnabarite: Durand, 73b
- Mineral sulphides of iron: Larsen, 12
- Mineralogical notes: Schaller, 11
- Minerals, Chester, Mass.: Palache, 09d; Quincy, Mass.: Warren (C H), 11a
- Minerals in rock sections, optical determination: Luquer, 97
- Model to illustrate symmetry: Phillips, 13
- Mohawkite: Koenig, 04
- Monoclinic crystals, conventional position: Gill, 13
- Mosesite, Terlingua, Tex.: Canfield, 10; Schaller 12



## Crystallography—Continued.

- Muscovite in Cockeysville marble, optical properties: Clark (R W), 15  
 Natramblygonite: Schaller, 13c  
 Natrolite, British Columbia: Phillips (A H), 16a  
 Nature of crystals: Goldschmidt, 11  
 Neocolemanite: Eakle, 11  
 Neptunite: Ford (W E), 09  
 Notation of faces of crystals: Egleston, 71, 74  
 Optical mineralogy: Groth, 10; Luquer, 96b; Winchell (N H), 09a  
 Parisite and other minerals; Quincy, Mass: Palache, 11  
 Pearcite, Sierra Mojada, Mex.: Van Horn (F R), 11b  
 Penfieldite: Larsen, 17g  
 Plotting crystal zones on the sphere: Blake (J M), 17  
 Plumbojarosite, Utah: Hillebrand, 10a  
 Polianite: Dana (E S), 88  
 Polybasite: Penfield, 98a  
 Polyhedron of the diamond lattice: Adams (E Q), 18  
 Prehnite, Guanajuato, Mex.: Hlawatsch, 10  
 Principles: Hinrichs, 71  
 Pressure phenomena accompanying growth of crystals: Taber, 17  
 Pyrite: Zimanyi, 12  
   carrying gold and galena of unusual habit: Pogue, 09a  
   Colorado: Ayres, 89  
   Utah: Rogers (A F), 09  
 Pryolusite, Virginia: Watson, 18d  
 Pyromorphite: Bowles, 09, 11; Shannon (E V), 17  
 Quartz: Troost, 22  
   Alexander Co., N. C.: Pogue, 12  
   Centerdale, R. I.: Hawkins, 18a  
   etching: Meyer (O), 90  
 Quebec, Megantic Co.: Poitevin, 18  
 Rhodonite, New Jersey: Ford (W E), 11b  
 Ruby, North Carolina: Pratt, 99b  
 Scapolite, gypsum, and fayalite: Smith (G O), 94  
 Spencerite, crystal form: Walker (T L), 17, 18  
 Stephanite, Mexico: Ford, 08  
 Striations of crystals: Egleston, 74a  
 Symbols: Dana (J D), 35  
 Teaching optical mineralogy: McNair, 11; Pogue, 18a  
 Tetrahedral combinations, relation to crystal-line form: Blake (J C), 01a  
 Textbook: Bayley, 10; Dana (E S), 16; Wadsworth, 09; Walker (T L), 14  
 Thenardite, San Bernardino Co., Cal.: Ayres, 89  
 Topaz, crystallization: Chapman, 93  
 Tourmaline, Macdonald Island, Baffin Land: Ledoux, 18b  
 Triphylite: Penfield, 95  
 Turquoise, Virginia: Schaller, 12, 12a  
 Vanadinite: Guild, 11  
 Variscite, Utah: Schaller, 12, 12c, d  
 Veins of asbestiform minerals, origin: Taber, 16  
 Water crystals: Canfield, 17a

## Crystallography—Continued.

- Willemite: Palache, 13a, 14a  
 Wulfenite: Guild, 11  
 Zincite: Dana (E S), 86e  
 Crystosphenes: Tyrrell, 04  
 Cuba. *See also* West Indies.  
   Discovery of fossil mammals with reference to geographic conditions: Spencer (J W), 10d  
   General: Agassiz (A), 94; Cía, 54; Fernández de Castro, 77a, 82; Hill (R T), 98d; Rodríguez Ferrer, 82; Sagra, 42; Saussure, 82; Taylor (R C), 36a; Valdés Ragués, 97  
   Geographic evolution: Spencer (J W), 95a  
   Isle of Pines: Jennings, 13  
   Northeastern Cuba: Taylor (R C), 43a  
   Radiolarian earths: Hill (R T), 95c  
   Union with continent: Fernández de Castro, 81  
*Economic geology.*  
   Asphalt: Vaughan, 02e; Banes: Rodríguez, 78  
   Barite associated with iron-ore, Pinar del Rio Province: Catlett, 08  
   Batabano phosphates: Corral, 13  
   Bitumen: Vaughan, 02e  
   Bituminous deposits, Cárdenas: Peckham, 01  
   Chapapote: González del Valle, 72  
   Climate, influence on ore formation: Aubouin, 17  
   Coal: Blake (J H), 42; Havana: Taylor (R C), 37a, 39  
   Copper: Lawrence, 06, 10  
     Cobre, Oriente: Cía, 17; Emerson (E H), 18; Lopez de Quintana, 17  
     Cobre, Santiago: Ansted, 56; Moffit, 03  
     Gibara region: Taylor (R C), 46  
     Havana: Weed, 05g  
     Manicaragua, Santa Clara: Usera, 17  
     Pinar del Rio region: Vail, 16  
     San Fernando lodes, Cienfuegos: Ansted, 57  
     Santa Clara Province: Vaughan, 01b  
   General: Brown (H C), 02; Cía, 54; Hayes, 01  
   Gibara region: Taylor (R C), 37  
   Gold: Fernández, 64a  
   Havana region: Galeotti, 41; Salterain y Legarra, 80  
   Holguin district: Taylor (R C), 37  
   Iron: Kemp, 10b; Lawrence, 10; Little (J E), 17; Spencer (A C), 08, 08c; Wedding, 92; Weld, 09, 18; Willey, 13; Woodbridge, 14  
   Camaguey and Oriente provinces: Cumings (W L), 11; Spencer (A C), 11  
   central and northeastern areas: Leith, 11b  
   Daiquiri district: Kemp, 15a; Lindgren, 15b; Singewald, 16  
   Firmeza district, Oriente Province: Roesler, 16; Singewald, 16  
   Mahobal: Booth, 40  
   Mayari: Guardiola, 12; Hayes, 11a; Kemp, 15; Leith, 15c; Anon, 07c, 08a  
   Moadistrict: Cox (J S), 11; Hayes, 11a; Woodbridge, 11, 11a; Anon, 08a  
   Pinar del Rio Province: Catlett, 08  
   reserves: Kemp, 10b  
   residual iron ore: Spencer (A C), 08, 08c; Weld, 09  
   Santiago district: Chisolm, 91; Kimball, 84a, b, c; Spencer (A C), 01; Wilson (E B), 10



**Cuba—Continued.****Economic geology—Continued.**

Manganese: Chibas, 01; Santiago: Spencer (A C), 02, 03b

Mineral resources: Brown (H C), 02; Cabrera, 98; Montoulieu, 18

Naptha, Santa Clara: Richardson (C), 10a

Northeastern Cuba: Taylor (R C), 37

Ore deposits: Henning, 11

Oriente Province: Singewald, 16

Petroleum: Brödermann, 17b, 18c; DeGolyer, 18; Ortega, 18; Vaughan, 02e

Bacuranao: Brödermann, 17a

Caimito: Brödermann, 17d

Havana Province: Brödermann, 17, 18a

Pinar del Rio: Brödermann, 17c

Santa Clara: Brödermann, 18b

Sierra del Rosario: Brödermann, 18

Puerto Principe: Aubouin, 17a

Santiago district: Souder, 05

**Historical geology.**

Central Cuba: Torre, 92

Daiquiri district: Kemp, 15a; Lindgren, 15b

Firmeza district, Oriente Province: Roesler, 16

General: Cía, 54; Fernández de Castro, 81; Hayes, 01; Hill (R T), 94a, 95b; Martin (K), 88; Matthew (G F), 73; Salterain y Legarra, 80; Scudder, 65c; Valdés Ragués, 97

Gibara region: Taylor (R C), 37

Guantanamo Bay: Meinzer, 16a

Havana region: Galeotti, 41; Salterain y Legarra, 80

Holguin district: Taylor (R C), 37

Jurassic strata: Torre, 10, 10b, 12; Vesa y Fil-lart, 09

Mayari district: Kemp, 15

Northeastern Cuba: Taylor (R C), 46

Oceanic series: Gregory (J W), 95

Petroleum fields: DeGolyer, 18

Santiago: Ansted, 56; Pellitero, 95

Taconian (?) rocks: Crosby, 83d

Viñales, Pinar del Rio: Corral, 11

Yumuri Valley: Spencer (J W), 94g

**Mineralogy.**

Chrysocolla, Gibara: Jackson, 35

Meteorite: Solano y Eulate, 72

Santiago province: Hamilton, 03

**Paleontology.**

*Aetobatis poeyii* (placoid): Fernández, 73

*Asterostoma*: Cotteau, 71; Fernández, 77

Central Cuba: Torre, 92

Echinids: Cotteau, 81, 97

Encope, echinoid: Cortázar, 80

Foraminifera: Orbigny, 39

General: Fernández 76; Matthew (G F), 73; Parra, 87

Jurassic Ammonites: Torre, 10, 10b

Jurassic fossils: Lea, 40

Mammalia: Allen (G M), 17, 18; Egozcue y Cía, 72; Fernández, 64; Matthew (W D), 13f, 14c; Vaughan, 02g

discovery: Spencer (J W), 10d, e

Isle of Pines: Peterson, 17

Quaternary: Torre, 10a, 12a

Megalocnus: Matthew (W D), 18d; Torre, 15

Myomorphus: Fernández, 71; Pomel, 68

Placoid tooth: Fernández, 72

**Cuba—Continued.****Paleontology—Continued.**

Pleistocene, eastern Cuba: Vanatta, 12

Quaternary fossils: Brown (B), 13a

Squalus: Melero, 75

Vertebrates, Cienfuegos: Leidy, 68c

**Petrology.**

Daiquiri: Lindgren, 15b

Firmeza district, Oriente Province: Roesler, 16

General: Adán de Yarza, 95

Mayari district: Kemp, 15

**Physical geology.**

Earthquakes: Salterain, 83; 1851-55: Poey, 55

**Physiographic geology.**

Coral reefs: Crosby, 83a

Eastern Cuba: Crosby, 83c

General: Hill (R T), 94a, 95b, 98e; Vaughan, 02f

Guantanamo Bay: Meinzer, 16a

Terraces, Cape Maysi: Hershey, 98a

Yumuri Valley: Spencer (J W), 94g

**Underground water.**

General: Fuller, 05c

Cubanite, Montana: Winchell (H V), 98a

Cuestas, drainage: Davis (W M), 99a

Culbertson lignite field, Valley Co., Mont.: Beekly, 12

Cumberland Gap coal field, Ky.: Ashley, 96; Pultz, 07

**Curacao.**

General: Cleland, 09

**Historical geology.**

General: Gabb, 73b

**Mineralogy.**

Martinite: Kloos, 89

**Paleontology.**

Corals: Vaughan, 01

Mollusca: Lorié, 89

**Petrology.**

General: Kloos, 89

Current ripples: Bucher, 17

Currents, bottom: Kindle, 15b; geologic action: Davis (C H), 49; Paleozoic, direction: Hall, 57c

Curries Mountain, N. B.: Bailey (L W), 10a

Currituck Banks, N. C.: Cobb, 06a

Currituck Sound: Wieland, 97a

Cuspate forelands: Gulliver, 96

Cusps. *See* Beach cusps.

Cuyuna iron range, Minn.: Adams (F S), 10; Kellogg, 13; Leith, 07a; Thomas (K), 12a; Winchell (N H), 07

Cyathophycus: Walcott, 81a

Cyathophyllidae: Dana (J D), 46

Cycads. *See* Paleobotany.

Cycles of deposition: Hunt, 74n; Newberry, 74c

Cycles of gradation: Hayes, 99e

Cyclocrinus: Roemer, 88

Cyclocystoides: Raymond (P E), 13d; Salter, 58

Cyclora in phosphate deposits: Miller (A M), 96

Cylinders in Potsdam sandstone: Kavanagh, 89

Cynthiana formation: Miller (A M), 15

Cyphornis: Cope, 95a

Cyrtoceras: Whiteaves, 06e

Cyrtolite, Bedford, N. Y.: Luquer, 04a

Cystoidea. *See also* Echinodermata.

Agelacrinidae: Foerste, 14b

Agelacrinites, Canadian: Raymond (P E), 15

Chemung: Clarke (J M), 01a



## Cystoidea—Continued.

- Agelacrinites and Streptaster, Richmond group:  
Williams (S R), 18
- Agelacrinites billingsii, Peterboro, Ont.: Chapman (E J), 60b
- Agelacrinites rectiradiatus, Richmond group,  
Ohio: Shideler, 18
- Agelacrinus: Spencer (W K), 04
- Agelacrinus holbrookii: James (U P), 87
- Anomalocystites: Woodward (H), 80
- Astrocystites, Trenton, Ottawa, Ont.: Whiteaves, 97a
- Camarocystites: Foerste, 16a
- Canada: Grant (J A), 80; Ordovician: Billings, 58a
- Caryocrinites: Foerste, 16a
- Cyclocystoides: Raymond (P E), 13d; Salter, 58
- Edrioasteroidea: Hudson, 16a
- Enoploura, Cincinnati: Wetherby, 79
- Holocystites, Niagaran, Ind.: Miller (S A), 78c, 79c, 80a, 92b
- Hybocystis, Ontario: Parks, 08b
- Indiana, Jefferson Co.: Hubbard (G C), 92
- Lepadocystinae: Foerste, 14b
- Maryland, Devonian: Schuchert, 13b
- Missouri: Rowley, 00
- Morphology: Wachsmuth, 87
- Ontario, Clinton formation: Parks, 10a
- Trenton limestone: Billings, 54; Kirkfield: Springer, 11b
- Pelmatozoa, eleutherozoic: Kirk, 11
- Silurian, West Virginia: Schuchert, 03d
- Silurian and Devonian: Schuchert, 04a
- Steganoblastus, Trenton, Ottawa, Ont.: Whiteaves, 97a
- Stephanocrinus: Roemer, 50
- Strophocrinus: Sardeson, 99
- Structural features: Billings, 68, 69b
- Trenton, Kentucky: Wetherby, 81b
- Dadoxylon: Penhallow, 00
- Daedalus: Sarle, 06
- Daimonelix: Barbour, 92, 92a, 95, 95a, 97, 97c; James (J F), 95; Kenyon, 95; Perisho, 12; Peterson, 04a
- distribution: Barbour, 03a
- Black Hills: O'Harra, 10
- origin: Peterson, 05, 05a; Riggs, 09
- vegetable tissues in: Jennings (O E), 05
- Dahlonga gold deposits, Ga.: Lindgren, 06c
- Dakota flora: Lesquereux, 92
- Dakota group: Hayden, 67b; Sternberg, 81c
- Dakota sand, oil, gas and water content: Huntley, 15a
- Dalles of the St. Croix: Upham, 96q
- Dan River coal field, N. C.: Stone (R W), 12b
- Dana, J. D., biography: Beecher, 96a; Clarke (J M), 13c; Dana (E S), 95a; Farrington, 95a; Gilman, 99; Hadley, 07, 13; Hovey, 13b; Le Conte, 96; Merrill (G P), 13; Powell, 96; Rice (W N), 10, 13, 15; Schuchert, 15a; Williams (H S), 95b
- Danforth Hills coal field: Gale, 07a
- Danish West Indies, geology: Böggild, 07
- Dante coal field, Va.: Stone (R W), 07b
- Danville folio, Ill.-Ind. (no. 67): Campbell (M R), 00

- Daubrée experiment and capillarity: Johnston (J), 14
- Davallia: Knowlton, 10a
- Davis, C. A., biography: Lane, 16a, 17a
- Davis, W. M., biography: Huntington, 12
- Dawson, G. M., biography: Adams (F D), 01c, 03a; Ami, 01k; Harrington (B J), 01; Hinde, 97
- Dawson, J. W., biography: Adams (F D), 99b, 00b, 01b; Ami, 00d, i; Dawson (J W), 01
- Dawsonite: Graham (R P D), 09
- Dawson Springs quadrangle, Ky.: Crider, 14
- Dayton folio, Wyo. (no. 141): Darton, 06c
- Deane, James, biography: Bouve, 58
- Death Valley: Chapman, 06
- Debris fans: Hilgard, 02
- Decay of rocks: Hunt, 83c
- Decomposition of rocks. *See Weathering.*
- Deep Creek district, Uinta Co., Utah: Lupton, 12
- Deep-sea deposits: Chamberlin (T C), 13; Crosby, 79b
- Deep wells. *See Borings.*
- Deformation.
- Contemporaneous deformation: Lahee, 14b
- Crustal shortening: Van Hise, 98
- Earth's rotation, bearing on deformation: Chamberlin (T C), 09
- Excavation deformations: MacDonald (D F), 13e
- General: Leith, 13; McGee, 94e; Van Hise, 98
- Lithosphere: Chamberlin (T C), 07c
- New England, southwestern: Hobbs, 03a
- Pennsylvania: Claypole, 84l
- Deformation of rocks: Adams (F D), 18
- Deinosuchus hatcheri: Holland, 09
- Delavan lobe of Lake Michigan glacier: Alden, 04
- Delaware.
- Clay containing recent shells, Lewes: Martin (D S), 71b
- Philadelphia district: Bascom, 09a
- Survey report: Booth, 39
- Economic geology.*
- Cement materials: Eckel, 13
- Clay deposits: Matson, 13
- Dover quadrangle: Miller (B L), 06
- General: Booth, 41
- Peat deposits: Cresson, 91
- Historical geology.*
- Coastal Plain formations: Clark (W B), 09a
- Cretaceous: Clark (W B), 95a, 97c, 07
- Crystalline rocks: Chester (F D), 86
- Delaware Valley: Cresson, 89
- Dover quadrangle: Miller (B L), 06
- Eocene: Clark (W B), 96a
- Gabbro area: Chester (F D), 90
- General: Booth, 41; Chester (F D), 84, 84a; Darton, 96d
- Greensand deposits: Ashley, 17a
- Mattawan formation: Clark (W B), 04b
- Tertiary: Heilprin, 84a
- Mineralogy.*
- Feldspar: Boyé, 41
- Fibrolite: Vanuxem, 29
- Serpentine, crystallized, Wilmington: Lewis, 83k
- Paleontology*
- Ammonites: DeKay, 27
- Cretaceous: Morton, 30a



**Delaware—Continued.***Paleontology—Continued.*

- Flabellaria, Deep Cut: Berry, 05b  
 Mollusca, Cretaceous: Morton, 29c  
 Ostrea, St. George's, Newcastle Co.: Morton, 29a  
 Plants: Berry, 06b; Magothy formation: Berry, 07f  
 Scaphites: Morton, 29d

*Petrology.*

- Gabbros: Chester (F D), 90

*Physiographic geology.*

- Boulder drift: Chester (F D), 83  
 Bryn Mawr gravel: Lewis, 80f  
 Drift, stratified: Chester (F D), 83a  
 Dunes, Cape Henlopen: Martin (D S), 71b  
 Sand dunes, Lewes: Rothrock, 89  
 Quaternary gravels: Chester (F D), 84b, 85

*Underground water.*

- General: Clark (W B), 18a; Darton, 96d, 05e  
 Water-bearing horizons: Darton, 95a

Delaware limestone: Prosser, 05a

Delaware Water Gap: Walter, 95; origin: Stose, 16a

Delphinodon, Miocene, Maryland; True, 12

Delta plain, Andover, Mass.: Mills (F S), 03

**Deltas.**

- Ancient delta deposits: Grabau, 12b  
 Connecticut, Brewsters Neck: Gulliver, 06  
 Criteria for recognition of delta deposits: Barrell, 12a  
 Delta deposits: Barrell, 12a; Grabau, 12b  
 Desert deltas, rate of growth: Keyes, 18a  
 Esker fans, structure: Jaggar, 12  
 Experiments in delta formation; Smith (A L), 09  
 Formation of deltas: Dryer, 10  
 General: Credner (G R), 78; Daly, 01a; Grabau, 13; Shaw (E W), 14c  
 Maine, Androscoggin Lake: Burr, 99  
 Mississippi River: Delafield, 29; Fontaine, 74; Forshey, 74; Hilgard, 70, 70b, 06b, 11; Holmes (N), 75; Howell, 70; Humphreys, 61; Kohl, 62; Long, 58; Lyell, 47a; McBeth, 05a; Shaw (E W), 14b, c; Thomassy, 60a, b  
   **growth:** Upham, 02a  
   **rate of formation:** Lyell, 69  
 Paleozoic: Graubau, 13b  
 Rio Colorado: Macdougall, 06, 07  
 St. Clair River: Cole (L J), 03  
 Upper Devonian, Appalachian geosyncline: Barrell, 13a, 14  
 Valdez, Alaska: Johnson (B L), 18a  
 Virginia, New River district, Mississippian delta: Branson, 12

Dendrites: Lewis, 80g

**Denudation. *See also* Erosion.**

- Chemical denudation: Clarke (F W), 10  
 Circumcontinental growth, rate: Chamberlin (T C), 13  
 Continental denudation: Shaw (E W), 15c; rate of, error in estimating: Free, 09  
   General: Davis (W M), 98; Keyes, 140  
 Denver Basin, Colo.: Emmons (S F), 96  
 Denver formation: Cross, 89a; age: Cope, 89u; origin: Davis, 97a  
 Depew quadrangle, N. Y.: Luther, 14

**Deposition. *See also* Sedimentation.**

- Appalachian region: Glenn, 11  
 Conditions: Willis, 93  
 Continental deposits: Keyes, 13m  
 Continental shelf, origin: Cotton, 18  
 Eolian deposits, eastern Minn.: Hall (C W), 99a  
 Geyser waters and deposits, Yellowstone National Park: Leffmann, 83  
 Glacier deposits: Tarr, 97i  
 Silica and lime deposition: Darton, 12b  
 Tufa deposits, Salton Sink: Jones (J C), 14  
 Deposition of ores. *See* Ore deposits, origin.  
 Derby, O. A., biography: Branner, 16a  
 Dermolith: Jaggar, 17c  
 Desert basins: Free, 14  
 Desert deltas, rate of growth: Keyes, 18a  
 Desert pavements: Free, 11a  
 Desert varnish: Surr, 09c; Turner, 09  
 Deserts.  
   Colorado Desert: Mendenhall, 09d  
   Desert depressions, origin: Hobbs, 18  
   Erosional and degradational processes: Hobbs, 18  
   lineaments of: Keyes, 09i  
   Mohave Desert: MacDougall, 16  
   North America: Walther, 92  
   Western States: Walther, 92a  
 Desiccation conglomerates: Hyde, 08  
 Desiccation of the earth: Von Herrmann, 18; of western America: Whitney, 80a  
 De Smet folio, S. Dak. (no. 114): Todd, 04a  
 Desmostylus: Hay (O P), 15a; Merriam, 06, 11b, d; McCornack, 14;  
 Determination of barium: Langley, 08  
 Detroit River area: Nattress, 12, 12a  
 Detroit River series, age: Stauffer, 16  
 Deutschman's Cave, Banff, B. C.: Ayres, 07-07b  
 Devils Tower folio, Wyo (no. 150): Darton, 07b  
 Devonian. *See also* Paleontology, Devonian.  
   Alabama, Birmingham district: Burchard, 10c; Butts, 10a; Gibson, 93  
   Cahaba region: Smith (E A), 90a  
   Coosa Valley: Hayes, 94e  
   Gadsden quadrangle: Hayes, 96  
   northeastern: Hayes, 92  
   Stevenson quadrangle: Hayes, 95  
   Tennessee Valley: McCalley, 96  
 Alaska: Brooks, 07  
   Broad Pass region: Moffit, 15  
   Cape Lisburne region: Collier, 06  
   Chisana-White River district: Capps, 16  
   Circle quadrangle: Prindle, 13b  
   Cosna-Nowitna region: Eakin, 18  
   Fairbanks quadrangle: Prindle, 13  
   Fortymile quadrangle: Prindle, 09  
   Gravina and Revillagigedo islands: Chapin, 18a  
   Gravina Island: Smith (P S), 15  
   Innoko district: Maddren, 10  
   international boundary: Cairnes, 14  
   Koyukuk-Chandalar region: Maddren, 13  
   Mount McKinley region: Brooks, 11  
   Porcupine River: Kindle, 08a  
   Porcupine to Artic boundary: Maddren, 12a  
   Rampart region: Prindle, 06b  
   Rocky Mountains: Schrader, 02  
   Ruby-Kuskokwin region: Mertie, 16



## Devonian—Continued.

- Alaska: Seward Peninsula: Collier, 08a  
 Solomon and Casadepaga quadrangles:  
   Smith (P S), 10  
 southeastern: Kindle, 07; Wright (F E), 08  
 southwestern: Spurr, 00  
 Tolovana district: Mertie, 17  
 Yukon, upper: Brooks, 07c  
 Yukon-Tanana region: Prindle, 05, 08  
 Alaska-Yukon boundary: Cairnes, 14b  
 Alberta: Malcolm, 13; Meek, 67  
 Athabasca River: Bell (R), 85a; McLearn, 17  
 Bighorn coal basin: Malloch, 11  
 Blairmore-Frank coal fields: Leach, 03  
 Lake Minnewanka: Shimer, 13  
 northern: McConnell, 93  
 Peace River section: McLearn, 18  
 Roche Miette area: Dowling, 12  
 Rocky Mountains: Allan, 13; Burling, 16;  
   McConnell, 87  
 Appalachian region: Barrell, 14; Rogers (H D),  
   57b; Williams (H S), 97; southern: Hayes,  
   94g  
 Arctic regions: Dawson, 87a; Feilden, 78; Mc-  
   Millan, 10; Meyer (O E), 11; Ellesmere  
   Land: Hottedahl, 17  
 Arizona: Blake (W P), 01a; Ransome, 16  
 Bisbee quadrangle: Ransome, 04, 04b  
 Clifton quadrangle: Lindgren, 05  
 Fort Apache region: Reagan, 03b  
 Globe district: Ransome, 03, 04a  
 Grand Canyon: Walcott, 83c  
 northern: Darton, 10a  
 Ray quadrangle: Ransome, 15b  
 Santa Rita and Patagonia Mountains: Schra-  
   der, 15  
 southeastern: Dumble, 02  
 Warren district: Bonillas, 16  
 Arkansas: Williams (H S), 00a  
 Caddo Gap and De Queen quadrangles: Miser,  
   17  
 Eureka Springs-Harrison quadrangles: Pur-  
   due, 16  
 Fayetteville quadrangle: Adams (G I), 05  
 northern: Adams (G I), 04; Ulrich, 04; Wil-  
   liams (H S), 99a  
 Black shale: Butts, 13; Grabau, 15c; Williams  
   (H S), 97  
 British Columbia, Cranbrook area: Schofield, 15  
 Crowsnest and Flathead areas: Rose, 18  
 East Kootenay district: Schofield, 14  
 Elko to Kootenay Lake: Schofield, 13  
 Flathead area: MacKenzie, 16a  
 New Westminster and Nanaimo districts:  
   LeRoy, 08  
 northern: Whiteaves, 77  
 Vancouver Island: Clapp (C H), 09  
 California: Diller, 94b; Smith (J P), 10, 16  
 eastern: Ball (S H), 07; Spurr, 03  
 Inyo and White Mountains: Knopf, 14a  
 Inyo Range: Kirk, 18  
 Klamath Mountains: Diller, 03d; Hershey, 06  
 Lassen Peak quadrangle: Diller, 95  
 northwestern: Hershey, 01a  
 Redding quadrangle: Diller, 06  
 Shasta Co.: Fairbanks, 94e; Smith (J P), 94a  
 Taylorsville region: Diller, 08b

## Devonian—Continued.

- Canada: Ami, 00a, 01h; Dowling, 09; Ellis, 10;  
 Logan, 63; Selwyn, 84; Whiteaves, 99  
 eastern: Dawson (J W), 88h  
 Hudson Bay region: Bell (R), 85d  
 maritime provinces: Matthew (G F), 08  
 Catskill: Stevenson, 93a  
 Catskill and Chemung faunas, commingling:  
   Ashburner, 84e  
 Catskill group: Fuller, 02c; Hall, 62m, 64a;  
   Prosser, 91; Williams (H S), 00c; Winchell  
   (A), 63  
 Chapman sandstone, Maine: Williams (H S), 16  
 Chemung and Catskill: Stevenson, 92  
 Chemung group: Darton, 93a; Hall, 85f; Pros-  
   ser, 97; Winchell (A), 63  
 Chouteau fauna: Weller, 95  
 Cincinnati anticline, southern Kentucky:  
   Foerste, 02  
 Classification: Williams (H S), 86  
 Climatic zones: Matthew (G F), 12  
 Colorado, Elbert formation: Cross, 04a  
 Engineer Mountain quadrangle: Cross, 10  
 Gold Brick district: Crawford (R D), 16  
 Monarch district: Crawford (R D), 10, 13  
 Needle Mountains quadrangle: Cross, 05b  
 Ouray limestone: Kindle, 09  
 Ouray quadrangle: Cross, 07a  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 San Juan district: Endlich, 76  
 Silverton quadrangle: Cross, 01, 05  
 southwestern: Cross, 14a; Girty, 00; Spencer  
   (A C), 98a, 00  
 Tomichi district: Crawford (R D), 13  
 Columbus limestone, Ohio, thickness: Griggs, 04  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Correlation: Williams (H S), 91  
 New York, Watkins Glen-Catatonk district:  
   Williams (H S), 09a  
 Ohio: Stauffer, 16b  
 Pennsylvania: Butts, 08a  
 Delaware limestone: Prosser, 05a  
 Detroit River series, age: Stauffer, 16  
 Evolution of North America: Grabau, 09a  
 Faunal provinces, middle Devonian: Schuchert,  
   03c  
 Franklin: Low, 06  
 Gaspé sandstone, age: Clarke (J M), 10c; Schu-  
   chert, 10b; Williams (H S), 10a  
 General: Clarke (J M), 89c, 15a; Dawson (J W),  
   63d; Lesley, 75a; Schuchert, 95a, 05a, 13d;  
   Sharpe, 48; Ulrich, 11a; Williams (H S),  
   88, 88a, 90b, 97, 05  
 Genesee shale and Tully limestone, relation-  
   ship: Grabau, 17  
 Georgia: Veatch (J O), 09  
 Coosa Valley: Hayes, 94e  
 northern: Maynard, 12  
 northwestern: Spencer (J W), 93  
 Polk Co.: Spencer (J W), 91a  
 Ringgold sheet: Hayes, 94  
 Rome quadrangle: Hayes, 02  
 Goniatite beds, Rockford, Ind.: Hall, 62a  
 Greenland: Böggild, 17  
 Julianehaab region: Ussing, 11  
 northeastern: Nathorst, 01



## Devonian—Continued.

Hamilton, New York: Grabau, 15b; Prosser, 97  
 Hamilton group, Thedford, Ont.: Shimer, 02  
 Helderberg limestones: Clarke (J M), 91d; Davis (W M), 83a  
 Hercynian question: Clarke (J M), 89c  
 Hiatus in continental interior: Keyes, 02h  
 Idaho, eastern: Umpleby, 12  
   Lemhi Co.: Umpleby, 13  
   Mackay region: Umpleby, 17  
   phosphate reserve: Richards (R W), 11b  
 Illinois: Weller, 06a; Worthen, 66, 68a, 70, 73  
   Calhoun Co.: Weller, 07c  
   Cap au Gres: Keyes, 98n  
   Grand Tower (Onondaga) formation: Savage, 10c  
   Murphysboro and Herrin quadrangles: Shaw (E W), 12b  
   northern: Udden, 95  
   northwestern: Carman, 09  
   Peoria quadrangle: Udden, 08c, 12  
   Rock Island region: Ekblaw, 12; Tiffany, 85; Udden, 96, 97b  
   southern: Bain, 05b; Weller, 97a  
   southwestern: Savage, 08  
 Indiana: Hopkins (T C), 04a; Kindle, 01; Leverett, 89a  
   Bartholomew Co.: Elrod, 82  
   Brown Co.: Collett, 75  
   Carroll Co.: Thompson (M), 92a  
   Cass Co.: Elrod, 94  
   Clark and Floyd cos.: Borden, 74  
   Decatur Co.: Elrod, 83  
   Hamilton Co.: Brown (R T), 84a  
   Jackson Co.: Cox (E T), 75  
   Jasper Co.: Collett, 83b  
   Jefferson Co.: Borden, 75a; Culbertson, 16  
   Jennings Co.: Borden, 76  
   Johnson Co.: McCaslin, 84  
   Madison Co.: Brown (R T), 84a  
   Miami Co.: Gorby, 89  
   Rush Co.: Elrod, 84b  
   Scott Co.: Borden, 75  
   Shelby Co.: Collett, 82a  
   Silver Creek limestone: Siebenthal, 01  
   southern: Kindle, 99; Newsom, 03; Stauffer, 07a  
   southeastern: Siebenthal, 01  
 Iowa: Beyer, 06, 07b; Calvin, 06a; Hall, 58; Keyes, 93a, 12f, 13c, k, g; Norton, 94, 12; Webster, 89; White (C A), 70  
   Benton Co.: Savage, 05a  
   Black Hawk Co.: Arey, 06  
   Bremer Co.: Norton, 06  
   Buchanan Co.: Calvin, 91, 92c, 98a  
   Burlington, "Chemung": White (C A), 62  
   Butler Co.: Arey, 10  
   Cedar Co.: Norton, 01  
   Cedar Valley-Lime Creek unconformity: Thomas (A O), 12  
   Cerro Gordo Co.: Calvin, 97a  
   Chickasaw Co.: Calvin, 03a  
   Davenport: Barris, 80, 00  
   East Davenport: Pratt (W H), 82  
   eastern: Carman, 09  
   eastern outliers: Norton, 95  
   Fayette Co.: Savage, 05b

## Devonian—Continued.

Iowa: Floyd Co.: Thomas (A O), 13  
   Franklin Co.: Williams (I A), 06  
   Grundy Co.: Arey, 10a  
   Howard Co.: Calvin, 03  
   Independence shale: Calvin, 78  
   Jackson Co.: Savage, 06a  
   Johnson Co.: Calvin, 97, 97b  
   Linn Co.: Norton, 95b  
   Mitchell Co.: Calvin, 03b  
   Muscatine Co.: Calvin, 88d; Udden, 99  
   northeastern: McGee, 91; Norton, 95a  
   Rockford shales: Webster, 88a, 89c  
   Scott Co.: Norton, 99; Tiffany, 85  
   Sweetland Creek beds: Udden, 99a  
   Winneshiek Co.: Calvin, 06  
   Worth Co.: Williams (I A), 00  
 Ithaca group, New York: Clarke (J M), 97  
 Kentucky: Christy, 48; Foerste, 01; Lyon, 60b  
   Bath Co.: Linney, 86  
   Blue Grass region: Matson, 09  
   central: Kindle, 99  
   Chattanooga shale: Kindle, 12a  
   Chattanooga series: Ulrich, 12  
   Clark Co.: Linney, 85  
   Clinton Co.: Loughridge, 90  
   Cumberland Mountain region: Moore (P N), 78a  
   east-central: Foerste, 06  
   Falls of the Ohio: Hall, 79c  
   Fleming Co.: Linney, 86  
   Garrard Co.: Linney, 83  
   Irvine field: Shaw (E W), 17  
   Jefferson Co.: Butts, 15  
   Lincoln Co.: Linney, 83a  
   London quadrangle: Campbell (M R), 98a  
   Louisville region: Bassler, 09b; Yandell, 47  
   Marion Co.: Knott, 85  
   Montgomery Co.: Linney, 85  
   Nelson Co.: Linney, 84  
   Oldham Co.: Linney, 87  
   Pound quadrangle: Butts, 14  
   Richmond quadrangle: Campbell (M R), 98  
   Wayne Co.: Munn, 14a  
   western: Owen (D D), 57  
 Knoydart formation, Nova Scotia: Ami, 01g  
 Lower Helderberg group: Callaway, 78; Hall, 74b; Schuchert, 00a  
 Maine: Emmons (W H), 10a; Hitchcock, (C H), 61; Matthew (G F), 70; Williams (H S), 00  
   Androscoggin River headwaters: Huntington, 78  
   Aroostook Co.: Bailey, 88a  
   Cobscook Bay: Shaler, 86  
   Eastport quadrangle: Bastin, 13c, 14  
   northern: Hitchcock (C H), 61a  
   northwestern: Hitchcock (C H), 74b  
   Parlin Stream: Pirsson, 14  
   Perry districts: Smith (G O), 05  
   Somerset Co.: Clarke (J M), 09a  
 Manitoba: Kindle, 14a; McInnes, 13a; MacLean, 14; Malcolm, 13; Tyrrell, 92  
   Lake Winnipeg region: Dowling, 00a  
   Snake Island and Lake Winnipegosis: MacLean (A), 13  
   western: Tyrrell, 92



## Devonian—Continued.

- Manlius formation, New York: Schuchert, 03b  
 Maryland: Clark (W B), 97b, 06c; Md G S, 13;  
 Prosser, 13c; Schuchert, 03, 13a; Swartz,  
 10, 13  
 Accident and Grantsville quadrangles:  
 Martin (G C), 08a  
 Allegany Co.: O'Harra, 00; Prosser, 01b  
 correlation: Swartz, 13a  
 Garrett Co.: Martin (G C), 02  
 Lower Devonian, sections: Swartz, 13a  
 Pawpaw and Hancock quadrangles: Stose,  
 12b  
 Piedmont quadrangle: Darton, 96b  
 Romney formation: Prosser, 04a  
 Upper Devonian: Prosser, 13e; Swartz, 13c  
 Massachusetts: Emerson (B K), 17  
 Bernardston: Emerson (B K), 90  
 Hampshire Co.: Emerson (B K), 98  
 Michigan: Cook (C W), 14; Grabau, 07c; Lane,  
 09a; Winchell (A), 61; Winchell (N H),  
 76c  
 Ann Arbor quadrangle: Russell (I C), 08  
 Bay Co.: Cooper (W F), 06  
 Detroit district: Sherzer, 17  
 Detroit River area, Anderdon limestone:  
 Nattress, 12a  
 Grand Traverse region: Winchell (A), 66  
 Limestone Mountain, Houghton Co.: Case,  
 15a  
 Little Traverse Bay: Winchell (A), 66  
 Lower Peninsula: Lane, 95; Rominger, 76  
 Monroe Co.: Sherzer, 00  
 southeastern: Sherzer, 97  
 Sylvania sandrock contour: Nattress, 10  
 Sylvania sandstone: Grabau, 07h  
 Thunder Bay: Grabau, 01a  
 Upper Peninsula: Hall, 51b; Rominger, 73  
 Wayne Co.: Sherzer, 13  
 Minnesota: Grout, 14; Winchell (N H), 01  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Mower Co.: Winchell (N H), 75c, 84a  
 southeastern: Hall (C W), 92  
 southern: Hall (C W), 11a  
 Mississippi: Crider, 06, 06b, 07; Lowe, 15  
 Mississippi Valley: Keyes, 97b; upper: Owen  
 (D D), 52  
 Missouri: Branson, 18a; Broadhead, 93b; Gal-  
 laher, 00; Keyes, 02, 13e; Swallow, 55a,  
 58; Winslow, 95  
 Boone Co.: Broadhead, 98  
 Callaway Co., Hamilton beds: Rowley, 93a  
 Cape Girardeau Co.: Shumard (B F), 63d  
 central: Branson, 15b; Gregor, 09  
 Cooper Co.: Swallow, 55b  
 Greene Co.: Shepard, 98, 15  
 Jefferson Co.: Shumard (B F), 73  
 Lincoln Co.: Potter, 73  
 Louisiana: Keyes, 97f  
 Marion Co.: Swallow, 55b  
 Moniteau Co.: Meek, 55; Van Horn (F B), 05  
 Morgan Co.: Marbut, 08  
 northern: Broadhead, 96  
 Ozark Co.: Shumard (B F), 73  
 Ozark region: Crane (G W), 12; Keyes, 95g  
 Perry Co.: Shumard (B F), 73  
 Pike Co.: Rowley, 03

## Devonian—Continued.

- Missouri: Providence: Stewart (A), 96  
 Ste. Genevieve Co.: Shumard (B F), 59b, 73  
 southeastern: Shumard (B F), 55; Weller, 16c  
 southwestern: Hershey, 95a, c  
 Montana: Peale, 85a  
 Castle Mountain district: Weed, 96a  
 Dillon quadrangle: Winchell (A N), 14  
 Elkhorn district, Jefferson Co.: Weed, 01  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg fields: Pardee, 17  
 Helena region: Knopf, 13  
 Judith Mountains: Weed, 98  
 Little Belt Mountains: Weed, 00  
 Livingston quadrangle: Iddings, 94  
 Philipsburg quadrangle: Calkins, 15; Em-  
 mons (W H), 07a, 13b  
 southwestern: Douglass, 05a  
 Three Forks region: Haynes, 15, 16a; Peale,  
 93, 96; Raymond (P E), 07  
 Nevada: Meek, 60a  
 Ely district: Spencer (A C), 17  
 Eureka district: Hague (A), 83, 92  
 northeastern: Emmons (W H), 10  
 Robinson district: Lawson, 06  
 southwestern: Ball (S H), 07  
 New Brunswick: Ami, 00k; Bailey, 90a; Cred-  
 ner, 65; Dawson (J W), 55; Ells, 06a, c,  
 08a; Hind, 65; Matthew (G F), 70; Wilson  
 (W J), 09a; Young, (G A), 10  
 Bathurst: Young, 11a  
 Charlotte Co.: Matthew (G F), 65a  
 Dalhousie: Clarke (J M), 09a  
 Little River group: Matthew (G F), 95, 10a  
 northern: Bailey, 87; Ells, 81; and eastern:  
 Ells, 83  
 St. John plant beds: Matthew (G F), 01b  
 St. John region: Dawson (J W), 80c; Mat-  
 thew (G F), 63  
 southern: Bailey (L W), 65, 72, 77, 80; Ells, 12;  
 Matthew (G F), 65c  
 western: Bailey (L W), 86  
 New England: Brown (T C), 06  
 Newfoundland: Murray, 66, 81; Weston, 96a  
 New Hampshire, Littleton area: Lahee, 13  
 New Jersey: Cook, 68; Kummel, 09; Lewis, 15;  
 Weller, 03  
 Franklin Furnace quadrangle: Kummel, 08a  
 Green Pond Mountain: Darton, 85b, 94f;  
 Kummel, 02a  
 Raritan quadrangle: Bayley, 14  
 Sussex Co.: Kitchell, 55a; Walpack Ridge:  
 Weller, 00  
 New Mexico: Gordon (C H), 06; Lindgren, 10  
 Deming quadrangle: Darton, 17  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Silver City quadrangle: Paige, 16  
 southern: Darton, 17a  
 New York: Bigsby, 58; Clarke (J M), 00e, 03g,  
 08c, 12; Hall, 70; Hartnagel, 12; Sherwood,  
 78a; Williams (H S), 83b, 84; Williams  
 (S G), 83  
 Albany Co.: Darton, 94a  
 Attica-Depew quadrangles: Luther, 14  
 Auburn-Genoa quadrangles: Luther, 10  
 Becraft Mountain, Columbia Co.: Grabau, 03



## Devonian—Continued.

New York: Buffalo region: Ashburner, 89a; Luther, 06  
 Canandaigua and Naples quadrangles: Clarke (J M), 04b  
 Catskill group: Hall, 62m  
 Catskill Mountains: Clarke (J M), 15c  
 Cayuga Lake region: Cleland, 03a; Williams (H S), 80a, 86b; Williams (S G), 87  
 central: Clarke (J M), 97; Prosser, 93a; Smith (B), 16; Taber, 18  
 Chemung (base): Williams (H S), 83  
 Chemung series: Prosser, 99  
 Chenango and Otsego cos., Hamilton: Prosser, 88b  
 Chenango Co.: Clarke (J M), 94b  
 Columbia Co., Oriskany fauna: Beecher, 92  
 Corniferous: Eaton (A), 39  
 eastern: Prosser, 95, 03a  
 Eighteenmile Creek, Hamilton: Grabau, 96a  
 Elmira quadrangle: Clarke (J M), 05b  
 Erie Co.: Bishop, 97; Grabau, 98a, 00b; Houghton (F), 14  
 Genesee and Wyoming cos.: Williams (H S), 84d  
 Genesee section: Williams (H S), 87  
 Hamilton and Chemung series: Prosser, 97  
 Hamilton and Portage: Prosser, 93b  
 Hamilton series: Prosser, 99  
 Hamilton shale, coral beds: Smith (B), 12  
 Helderberg limestones: Darton, 94  
 Helderberg, Lower: Williams (S G), 86a, 87  
 Helderberg Plateau, northern end: Prosser, 00  
 Helderbergs, eastern: Prosser, 99a  
 Ithaca region: Kindle, 96; Williams (H S), 06  
 Livonia salt shale: Luther, 94  
 Madison Co.: Lincklaen, 45; Prosser, 88a  
 Marcellus beds: Clarke (J M), 01; Wood (Elvira), 01  
 Niagara quadrangle: Kindle, 13c  
 Niagara Falls region: Grabau, 01  
 Olean quadrangle: Clarke (J M), 02e, 03c  
 Oneida Co.: Brigham, 89  
 Oneonta and Chemung, relations: Darton, 93a  
 Oneonta sandstone, Chenango Co.: Beecher, 86b  
 Onondaga Co.: Luther, 97a; Schneider, 94  
 Ontario Co.: Clarke (J M), 85a, b; Luther, 97  
 Orange Co.: Ries, 97b; Cornwall: Dwight, 84a; Trilobite Mountain: Shimer, 05  
 Oriskany formation: Clarke (J M), 00f  
 Penn Yan-Hammondsport quadrangles: Luther, 06a  
 Portage and Nunda quadrangles: Clarke (J M), 08c  
 Portage region: Clarke (J M), 97e  
 Port Jervis: Barrett, 76a  
 Rondout: Van Ingen, 03  
 Schoharie Valley: Emmons (E), 48; Grabau, 06; Stevenson, 01  
 Seneca Co.: Delafield, 51; Lincoln, 97  
 Skunnemunk Mountain, Orange Co.: Darton, 94f; Hartnagel, 07a; Prosser, 92c  
 southeastern: Berkey, 11; Clarke (J M), 09a; Hall, 80a; Mather, 43  
 southwestern: Glenn, 03; Harris, 91a

## Devonian—Continued.

New York: Stafford limestone: Talbot, 03  
 Syracuse quadrangle: Hopkins (T C), 14  
 Third district: Vanuxem, 42  
 Tropicidoleptus zones: Williams (H S), 13  
 Tully limestone: Clarke (J M), 05c; Williams (S G), 87a  
 Ulster Co.: Chadwick, 10; Darton, 94b  
 Unadilla River: Prosser, 93  
 Watkins Glen quadrangle: Clarke (J M), 05b; Williams (H S), 04a  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 western: Clarke (J M), 91e; Hall, 43; Hussakof, 18; Prosser, 92d; Williams (H S), 81  
 western central: Prosser, 90  
 Yates Co.: Wright (B H), 84  
 New York series: Clarke (J M), 99i; revision of: Chadwick, 08  
 North America: Willis, 12  
 Northwest Territory: Keele, 10; Meek, 67  
 Great Slave Lake region: Cameron, 18  
 Mackenzie basin: Hébert, 75; Kindle, 16b  
 Nova Scotia: Ami, 00k; Dawson (J W), 55, 60b; Eells, 01d; Honeyman, 72; Malcolm, 12; Matthew (G F), 01e, 02e  
 Antigonish Co.: Ami, 01m; Honeyman, 66  
 Arisaig-Antigonish district: Williams (M Y), 11, 12, 14  
 Cape Breton Island: Fletcher, 79; Gilpin, 86c, 90b  
 eastern: Fletcher, 81, 87  
 Knoydart formation: Ami, 01f, g  
 Pictou and Colchester cos.: Fletcher, 92  
 Pictou coal field: Poole, 93, 04  
 southwestern: Bailey, 95, 98  
 Ohio: Bownocker, 15; Newberry, 71, 73, 78; Orton, 82, 88, 93a; Prosser, 05; Rogers (W B), 42a; Stauffer, 07, 07a, 09; Swartz, 07a; Verwiebe, 17a; Whitfield, 82b, 91; Winchell (N H), 76c  
 Bedford shale: Girty, 12b  
 Chattanooga series: Ulrich, 12  
 Cleveland shale, age: Cushing, 12  
 Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Corniferous: Bownocker, 98  
 Crawford Co.: Winchell (N H), 74  
 Defiance Co.: Winchell (N H), 74  
 Delaware Co.: Winchell (N H), 74, 74e  
 Erie Co.: Newberry, 74b  
 Fairfield Co.: Hyde, 12  
 Franklin Co.: Orton, 78a  
 Hamilton formation: Winchell (N H), 74d  
 Hardin Co.: Winchell (N H), 74  
 Henry Co.: Winchell (N H), 74  
 Huron Co.: Read, 78  
 Logan Co.: Hill (F C), 78  
 Lucas Co.: Gilbert, 73; Stauffer, 08  
 Marcellus shale: Whitfield, 80d  
 Marion Co.: Winchell (N H), 73  
 northeastern: Prosser, 12a; Whittlesey, 51b  
 northern: Kindle, 12b; Stauffer, 15a, 16b;  
 Huron and Cleveland shales: Prosser, 13  
 Ohio shales: Branson, 11a  
 Olentangy shale: Grabau, 17e



## Devonian—Continued.

- Ohio: Paulding Co.: Winchell (N H), 74  
 Pike Co.: Orton, 74  
 Putnam Co.: Winchell (N H), 74  
 Sandusky Co.: Winchell (N H), 73  
 Seneca Co.: Winchell (N H), 73  
 southeastern: Andrews, 71a  
 Union Co.: Winchell (N H), 74  
 Wood Co.: Winchell (N H), 74  
 Wyandot Co.: Winchell (N H), 73  
 Ohio basin: Claypole, 03  
 Ohio black shale: Orton, 83  
 Oklahoma: Wallis, 15  
 Arbuckle Mountains: Reeds, 10; Taff, 04;  
 Hunton formation: Reeds, 11  
 Atoka quadrangle: Taff, 02  
 Muscogee quadrangle: Taff, 06  
 northeastern: Siebenthal, 08a; Snider, 12, 15  
 southern: Hutchison, 11  
 Tahlequah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Olentangy shale, Ohio: Grabau, 15a, 17c;  
 Stauffer, 16b  
 Oneonta sandstones, New York: Clarke (J M),  
 97; Hall, 92b  
 Onondaga formation, Allegheny region: Kindle,  
 12; unconformity at base: Kindle, 13b  
 Onondaga sea in Allegheny region: Kindle, 11  
 Ontario: Bell (R), 89b; Knight (C W), 15a;  
 Malcolm, 15; Murray, 45, 54a; Nicholson,  
 74; Parks, 13b; Rogers (W B), 42a;  
 Stauffer, 16b  
 Anderdon, Corniferous: Nattress, 02, 11  
 Attawapiskat River: Lell (R), 87  
 Detroit River area: Nattress, 12  
 Hagersville district: Stauffer, 13  
 Mattagami basin: Baker (M B), 11  
 Oriskany sandstone and Ohio shale: Kindle,  
 14b  
 Port Colborne region: Stauffer, 13a  
 region between lakes Huron and Erie: Mur-  
 ray, 52  
 southwestern: Brumell, 93a; Hunt, 68b;  
 Murray, 57b; Parks, 03a; Stauffer, 11, 15  
 Sylvania sandrock contour: Nattress, 10  
 Thedford, Hamilton group: Shimer, 02;  
 Williams (M Y), 14b  
 western: Ami, 99b  
 Oriskany formation: Clarke (J M), 00f; Schu-  
 chert, 00a; Stauffer, 12  
 age: De Cew, 62  
 Onondaga Co., N. Y.: Wheelock, 03  
 Oriskany-Pic d'Aurore episode: Clarke (J M),  
 15b  
 Ozark region: Adams (G I), 01  
 Paleogeographic map: Willis, 09  
 Paleogeography: Grabau, 15  
 Pella beds: Udden, 02b  
 Pennsylvania: Butts, 08a; Claypole, 91b; Les-  
 ley, 92; Rogers (H D), 58; Verwiebe, 17a  
 Accident and Grantsville quadrangles: Mar-  
 tin (G C), 08a  
 Altoona section: Butts, 06  
 Amity quadrangle: Clapp (F G), 07a  
 Bedford Co.: Stevenson, 85  
 Blair and Huntingdon cos. section: Butts, 18  
 Blair Co.: Platt (F), 81a

## Devonian—Continued.

- Pennsylvania: Bradford Co., Chemung: Lilley,  
 84; Sherwood, 78; Lilley, 86  
 Cameron Co.: Sheaffer, 85  
 Carnegie quadrangle: Munn, 11a  
 Catskill: Claypole, 83; Lesley, 83d  
 Centre Co.: D'Invilliers, 84  
 Clarion quadrangle: Shaw (E W), 11e  
 Claysville quadrangle: Munn, 12  
 Clinton Co.: Chance, 78, 78a, 80  
 Crawford Co.: White (I C), 81  
 eastern: Prosser, 92b, 95  
 Ebensburg quadrangle: Butts, 05b  
 Elkland quadrangle: Fuller, 03a  
 Erie Co.: White (I C), 81  
 Foxburg quadrangle: Shaw (E W), 11b, e  
 Fulton Co.: Stevenson, 85  
 Gaines oil field: Fuller, 02a, 03  
 Hamilton sandstone: Claypole, 84k  
 Helderberg limestone: Reeside, 17  
 Huntingdon Co.: Ashburner, 77, 78; White  
 (I C), 85  
 Johnstown area: Phalen, 10, 11a  
 Juniata district: D'Invilliers, 91  
 Kingsmill white sandstone: Claypole, 83d  
 Lehigh Gap: Miller (B L), 11b  
 Lehigh River section: Hill (F A), 87b; Win-  
 slow, 87  
 Lycoming Co.: Meyer (A), 93, 93a; Sherwood,  
 80; Oriskany sandstone: Woolman, 86  
 McKean Co.: Ashburner, 80  
 Mercersburg-Chambersburg district: Stose, 09  
 Monroe Co.: White (I C), 82  
 oil regions: Carll, 80  
 Pawpaw and Hancock quadrangles: Stose,  
 12b  
 Perry Co.: Claypole, 84e, 85; fault: Claypole,  
 84a; Portage beds: Claypole, 84b  
 Pike Co.: White (I C), 82  
 Potter Co.: Sherwood, 80a  
 Rogersville quadrangle: Clapp (F G), 07b  
 southwestern: Stevenson, 78c  
 Sullivan Co.: Sherwood, 80  
 Susquehanna and Wayne cos.: White (I C),  
 81a  
 Susquehanna River region: White (I C), 83  
 Tioga Co.: Sherwood, 78  
 Tioga quadrangle: Fuller, 03a  
 Uniontown quadrangle: Campbell (M R), 02a  
 Venango district: Carll, 75  
 Warren Co.: Carll, 83  
 Warren district: Butts, 10; Randall, 75  
 western: Carll, 90  
 Wyoming Co.: Sherwood, 82  
 Portage and Chemung formations: Swartz, 08  
 Portage formation, New York: Clarke (J M),  
 97; Luther, 97, 02, 03  
 Quebec: Clarke, (J M), 00e  
 Dalhousie: Clarke (J M), 13d  
 eastern townships: Ells, 88  
 Gaspé district: Clarke (J M), 08b, 11a, 13d,  
 15b; Dawson (J W), 89a; Ells, 83a, 85;  
 Mailhiot, 11; Richardson (J), 58, 59;  
 Williams (H S), 10a  
 Lemieux, Gaspé Co.: Mailhiot, 18  
 Montreal district: Ami, 04a; Ells, 96  
 Orford area: Harvie, 12



## Devonian—Continued.

- Quebec: Percé: Clarke (J M), 05a  
 St. Helen's Island: Deeks, 90; Donald, 80; Nolan, 03  
 southern: Dresser, 10b; Harvie, 14  
 Rockford shales, Iowa: Webster, 89c  
 Rocky Mountain region: Kindle, 08b; Tomlinson, 17  
 Romney formation, Maryland: Prosser, 04a  
 Saskatchewan: McInnes, 13; Malcolm, 13; Lac LaRonge district: McInnes, 10  
 Silurian-Devonian boundary: Williams (H S), 00b  
 Sweetland Creek beds: Udden, 99a  
 Tennessee: Christy, 48; Foerste, 01; Killebrew, 78; Safford, 56, 69  
 Briceville quadrangle: Keith, 96b  
 Camden chert: Safford, 99  
 Chattanooga quadrangle: Hayes, 94b  
 Chattanooga series: Ulrich, 12  
 Cleveland quadrangle: Hayes, 95a  
 Columbia quadrangle: Hayes, 03  
 Coosa Valley: McCalley, 97  
 eastern: Burehard, 13a  
 Greenville quadrangle: Keith, 05  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Loudon quadrangle: Keith, 96  
 McMinnville quadrangle: Hayes, 95c  
 Maynardville quadrangle: Keith, 01  
 middle: Safford, 51  
 Morristown quadrangle: Keith, 96a  
 Perry Co.: Wade (B), 14  
 Pikeville quadrangle: Hayes, 95b  
 Sewanee quadrangle: Hayes, 94e  
 Standingstone quadrangle: Campbell (M R), 99  
 Waynesboro quadrangle: Drake, 14; Miser, 17a  
 western: Dunbar, 17a, 18; Foerste, 03b; Pate, 08  
 Texas, trans-Pecos front range: Baker (C L), 17  
 Traverse group, Michigan: Grabau, 02, 02a  
 Tully limestone and Genesee shale, relationship: Grabau, 17  
 Types of Devonian in North America: Williams (H S), 88b  
 United States: Conrad, 42a  
 Upper Devonian: Hartzell, 04  
 Upper Devonian delta of Appalachian geosyncline: Barrell, 13a  
 Utah, Cottonwood-American Fork region: Butler (B S), 15  
 Randolph quadrangle: Richardson (G B), 13  
 San Francisco district: Butler (B S), 13  
 Toquerville district: Huntington, 04  
 Uinta Mountains: Berkey, 05a  
 Wasatch Mountains: Blackwelder, 10a; Hintz, 13  
 Vermont: Richardson (C H), 06; Craftsbury: Richardson (C H), 12  
 Virginia, Abingdon quadrangle: Stose, 14  
 Appalachian region: Campbell (J L), 79a; Darton, 92c  
 Bristol quadrangle: Campbell (M R), 99a  
 Estillville quadrangle: Campbell (M R), 94  
 Franklin quadrangle: Darton, 96c

## Devonian—Continued.

- Virginia: James River valley: Campbell (J L), 82  
 Massanutten Mountain: Spencer (A C), 97  
 Monterey quadrangle: Darton, 99  
 Montgomery and Pulaski eos.: Campbell (M R), 94a  
 Pocahontas quadrangle: Campbell (M R), 96a  
 southwestern: Stevenson, 81e, d, 85a, 87  
 Staunton quadrangle: Darton, 94e  
 Tazewell quadrangle: Campbell (M R), 97  
 West Virginia: Grimsley, 06  
 Barbour Co.: Reger, 18  
 Buckhannon quadrangle: Taff, 96  
 Franklin quadrangle: Darton, 96c  
 Greene Co.: Page, 89  
 Greenbrier Co.: Meek, 80  
 Jefferson, Berkeley, and Morgan eos.: Grimsley, 16  
 Monterey quadrangle: Darton, 99  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Piedmont quadrangle: Darton, 96b  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Potomac River region: White (I C), 81c  
 Preston Co.: Hennen, 14  
 Romney region: Prosser, 15  
 Western States, fortieth parallel: King (C), 76a  
 Wisconsin: Chamberlin, 83; Cleland, 09a, 11; Hall, 62j; Monroe, 00; Weidman, 15  
 eastern: Chamberlin, 77a  
 Milwaukee: Monroe, 99; Hamilton formation: Teller, 00  
 Milwaukee quadrangle: Alden, 06  
 southeastern: Alden, 18; Lapham, 51a  
 Wyoming, Absaroka quadrangle: Hague, 99b  
 western: Blackwelder, 08b; Schultz, 18  
 Yellowstone National Park: Hague, 99; Weed, 96  
 Yukon: Cairnes, 08a  
 international boundary: Cairnes, 14  
 Lewes and Nordenskiöld rivers district: Cairnes, 10a  
 Poreupine to Arctic boundary: Maddren, 12a  
 Diabase, distribution in Massachusetts: Emerson, 08  
 Diadectes: Broom, 14; restoration: Case (E C), 07  
 Diadectidae, osteology: Case, 05  
 Diamond Head, Oahu: Hitchcock (C H), 06b  
 Diamond Hill-Cumberland district, R. I.-Mass.: Warren (C H), 14  
 Diamonds.  
 Arkansas, Pike Co.: Arkansas Diamond Company, 08; Branner, 09a; Eberle, 09; Fuller (J T), 08, 09; Glenn, 12e; Kunz, 08a; McCourt, 10; Millar, 09; Miser, 14; Schneider, 07, 08a; Washington, 08b  
 British Columbia, Tulameen district: Camsell, 11a, 12, 13  
 California: Aubury, 06; Storms, 17; Turner, 99b  
 black sands: Silliman (jr), 73  
 Santa Barbara Co.: Arnold, 07e  
 Canyon Diablo meteorite: Kunz, 93  
 Correlation of copper and diamonds in the glacial drift of the Great Lakes region: Farrington, 08  
 Emigrant diamonds in America: Hobbs, 99c  
 General: Kunz, 07b; Millar, 11



## Diamonds—Continued.

Genesis: Becker, 97c; Derby, 87, 11; Diller, 86b; Hamlin, 74; Kunz, 97a; Lewis, 86a, d, 97; Schneider, 08

Georgia, Hall Co.: Shepard, 45a

Great Lakes region: Bell (R), 06c; Farrington, 08; Hobbs, 99b

Matrix of the diamond: Lewis (H C), 87a

North America: Blue, 00a

North Carolina: Shepard, 46; McDowell Co.: Kunz, 87m

United States: Hobbs, 01e; Patterson, 50

Wisconsin: Hobbs, 94, 96a; Kunz, 94b

Diamondville coal field, Wyo.: Shurick, 08

## Diastrophism.

Basis of correlation: Chamberlin (T C), 09a; Keyes, 09n

Deep-sea deposits: Chamberlin (T C), 13

Foreset beds and slope deposits: Chamberlin (T C), 13

General: Chamberlin (R T), 14; Chamberlin (T C), 13, 13b; Dana (J D), 47a; Gilbert, 90; Schuchert, 18

Paleozoic shelf seas: Chamberlin (T C), 14a

periodic, production of: Chamberlin (T C), 13, 13b

Diatomaceae. *See also* Diatomaceous earth.

Alabama, Montgomery: Cunningham, 94

Arizona: Blake (W P), 03a

Aulisci, California: Deby, 93

Biddulphoid forms: Boyer, 00

California: Bailey (J W), 54, 54a, 55a; Edwards (A M), 93b

Santa Maria district: Arnold, 07f

Santa Monica: Hyde, 93; Schultze, 97

Colorado, Denver: Elmore, 98

Dismal Swamp: Woolman, 98

Dust on Bering Sea ice floes; Kindle, 09b

Florida, St. Augustine: Boyer, 95; Tampa: Bailey (J W), 51

General: Edwards (A M), 60; Elmore, 98

Iowa, Muscatine Co.: Myers, 99

Littoral plain: Edwards (A M), 93

Maine; Bailey (J W), 62

Maryland: Bailey (J W), 45c

Mexico: Díaz Lozano, 17

Minnesota, interglacial peat: Smith (H L), 93; Thomas (B W), 93

Missouri, St. Joseph: Elmore, 98

Nebraska: Barbour, 96a, 97d; Elmore, 96, 98a, 14a

Miocene: Barbour (E L), 10

Thomas Co.: Elmore, 14

New Jersey, southern: Woolman, 92

Triassic: Edwards (A M), 93c

Wildwood: Boyer, 95a

New York, Long Island, Neocene: Edwards (A M), 96; Bailey (J W), 38

Nova Scotia: MacKay, 84, 85

Occurrence: Edwards (A M), 70a

Oregon: Bailey (J W), 54a; River Chutes: Ehrenberg, 49

Paleozoic: White (M C), 62

Pennsylvania, Philadelphia: Cunningham, 86;

Delaware River clays: Woolman, 90a

Texas, Staked Plains: Woolman, 92a

## Diatomaceae—Continued.

Virginia: Bailey (J W), 45c, 46a; Richmond: Stodder, 76

Wisconsin, Milwaukee, peat marl: Edwards (A M), 59

Yellowstone National Park: Weed, 89b

Diatomaceous earth. *See also* Infusorial earth; Diatomaceae.

Canada: Denis, 03

Formation: Edwards (A M), 70c

Iowa, Muscatine Co.: Myers, 99; Udden, 99d

Maryland, Calvert Co.: Miller (B L), 07; St. Marys Co.: Miller (B L), 07a

Nebraska: Barbour, 97d; Elmore, 98, 14, 14a

Nevada, Reno region: Anderson (R), 09a

New York, Adirondacks: Cox (C F), 93, 94

Texas: Dumble, 95a

Virginia, Richmond district: Coryell, 76;

Darton, 11; Rogers, (W B), 81; Watson (T L), 07e, 12a; Anon, 80b

Diceratherium: Barbour, 06f; Peterson, 06a, 12b

Diceratherium cooki, mounted skeleton: Peterson, 11b

Diceratops, restoration: Lull, 05b

Dicotylineae: Leidy, 53b

Dictionary of names of minerals: Chester, 96

Dictyonema fauna of Navy Island, New Brunswick: Hahn, 12a

Dictyophyton: Hall, 63h; Roemer, 83, 84; Whitfield, 81a, d, e

Dictyospongidae: Hall, 97e, 98

Didymodus: Cope, 84g

Differential erosion and equiplanation: Cairnes, 12d

Diffusion of solids: Van Orstrand, 15

## Dikes.

Alaska, Berners Bay region: Knopf, 11

Anorthite, Ontario: Barlow, 95a

Arizona, conglomerate dike: Stewart (C A), 11  
Fort Apache region: Reagan, 03b

Arkansas: Kemp, 91, 91a; southwest-central: Miser, 13

Black dikes: Lakes, 09c

California, El Paso Range: Fairbanks, 97b  
limestone: Haehl, 04

Santa Cruz quadrangle: Branner, 09b

Camptonite dikes, Vermont: Marsters, 95, 95a

Clastic dikes: Newsom, 03a; Ouray, Colo.: Ransome, 00a, 01b

Clay veins in coal beds: Gresley, 98

Colorado, Apishapa quadrangle: Cross, 14

Boulder Co., Ward district: Palmer (C S), 98

Colorado Springs quadrangle: Finlay (G I), 16

Cripple Creek region: Stone (G H), 98

Magnolia district: Whitaker, 02

Ouray, clastic dike: Ransome, 00a, 01b

Spanish Peaks region: Hills, 89, 90b

Sugarloaf district, Boulder Co.: Crawford (R D), 09

Conglomerate dikes, southern Arizona: Campbell (M R), 04c; Stewart (C A), 11

Connecticut, basic dikes in Triassic: Griswold, 93

New Haven: Hovey, 97

Wallingford: Chapin, 34

Connecticut Valley: Whelpley, 45a

Formation: Shaler, 99c



**Dikes—Continued.**

General: Kemp, 07g  
 Georgia: McCallie, 01b  
 Inclusions in dikes, origin: Powers, 15  
 Kentucky, Crittenden Co., peridotite: Diller, 92a; Elliott Co.: Crandall (A R), 85, 87a, 10a  
 Laws of intrusion: Stevens (B), 11  
 Maine, Androscoggin Co.: Merrill (G P), 92  
   Johns Bay: Bascom, 99  
   Kennebunkport: Kemp, 90  
   Portland: Lord, 98  
 Maryland, Baltimore: Williams (G H), 85c  
 Massachusetts, Boston Basin, diabase dike: Hobbs, 88  
   Braintree: Dodge (W W), 83  
   Cape Ann: Shaler, 89b  
   Deerfield: Emerson, 82b  
   Essex Co.: Eakle, 98b  
   Hampshire Co.: Emerson, 98  
   Manchester: Pearce, 95  
   Medford area: Wilson (A W G), 01a  
   Nahant: Lane, 89  
   Quincy: Wolff, 84  
   Somerville: Earle, 99  
   Worcester: Perry (J H), 03  
 Mexico, Guanajuato, Silao: Wittich (E), 10a, b  
   Sonora, Sahuaripa: Brown (R G), 97a  
 Michigan, Gogebic range: Boss, 98  
   Marquette: Lane, 03c  
 Minnesota, Minnesota River valley: Hall (C W), 91c  
 Multiple diabase dike: Lawson, 94a  
 Nevada, albitite dikes: Ransome, 11d  
   Belmont: Spurr, 00d  
   Clark Co.: Bancroft (H C), 10a  
 New Brunswick, St. John: Matthew (W D), 95a  
 New Hampshire, Campton: Hawes, 79  
   White Mountains: Hubbard (O P), 38  
 New Jersey, northwestern: Emerson (B K), 82  
   Raritan quadrangle: Bayley, 14  
   Rocky Hill: Phillips (A H), 99  
   Sussex Co.: Emerson, (B K) 82a; Kemp, 93c  
 New York, Adirondack region: Cushing, 96a; Kemp, 96d; Miller (W J), 18a  
   Bedford area: Luquer, 96  
   Blue Mountain quadrangle: Miller (W J), 17  
   Brewster iron district: Koeberlin, 09  
   Broadalbin quadrangle: Miller, 11b  
   Canton quadrangle: Martin (J C), 16  
   Champlain Valley: Kemp, 91b  
   Clinton Co.: Cushing, 97; Eakle, 93  
   East Canada Creek: Schneider, 05a  
   Essex Co., Essex and Willsboro townships: White (T G), 94  
   Elizabethtown and Port Henry quadrangles: Kemp, 10c  
   Herkimer Co., Little Falls: Cushing, 02a  
   Hudson River Highlands: Kemp, 88c  
   In Hamilton shale: Smith (B), 09b  
   Ithaca, peridotite: Barnett, 05; Kemp, 91d; Matson, 05; Schneider, 03c  
   Lake Champlain region: Kemp, 93d  
   Manheim: Smyth (C H), 96a  
   Onondaga Co., Clintonville: Smith (B), 10; Smyth, 10; peridotite dikes: Luther, 97a  
   Orange Co.: Ries, 97b

**Dikes—Continued.**

Staten Island: Gratacap, 91  
 New York: Syracuse: Clark (B W), 14; Darton, 95; Schneider, 02, 03b; Smyth (C H), 02a  
   Washington Co., camptonite: Kemp, 89  
 North Carolina, Davidson Co.: Pogue, 10  
   Gold Hill district: Laney, 08, 10  
 Ontario, Frontenac, Leeds, and Lanark cos.: Miller (W G), 96  
   Grenville region: Harrington (B J), 77  
   Lake Huron region: Fairbanks, 90a  
   Port Coldwell: Kerr, 10  
   Rainy Lake region: Lawson, 88a, 91  
   Sudbury region: Walker (T L), 95  
   Thousand Islands: Smyth (C H), 94c  
 Origin: Shaler, 99e  
 Pennsylvania, Chester Co., trap dikes: Frazer, 96; Rand, 96  
   Delaware Co.: Rand, 87  
   Fayette and Green cos.: Smith (L B), 12  
   Lancaster Co.: Frazer, 78a  
   southeastern: Frazer, 84e; trap dike: Lewis, 85  
   South Mountain: Eaton (H N), 12  
 Phenocrysts, unusual orientation: Fuller, 99b  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
   Lake Memphremagog: Marsters, 95a  
   Richmond: Dresser, 01  
   St. Helen's Island: Nolan, 03  
   St. Hilaire and Rougemont mountains: O'Neill, 14  
 Rhode Island, Newport: Crosby, 86c  
 Sandstone dikes: Diller, 90; Newsom, 03a  
   Black Hills: O'Harra, 10  
   Eocene, Kentucky and Tennessee: Glenn, 04d  
   Georgia: McCallie, 03a  
   intrusive in granite: Cross, 94c  
   Nebraska: Hay (R), 92  
   Rockwall, Tex.: Paige, 09b  
   Ute Pass, Colo.: Crosby, 95  
   White River Eocene: Case, 95a  
 Spheroidal weathering of dikes: Kemp, 09a; Villars, 09  
 Trap: Jackson, 45d, 56e  
 Triassic, Connecticut and New Jersey: Rogers (H D), 43e  
 Utah, Santaquin and Mount Nebo region: Loughlin, 18a  
 Vermont: Hitchcock (E), 61  
   Ascutney Mountain: Daly (R A), 03  
   Calais, East Montpelier, and Berlin: Richardson (C H), 16  
   Chittenden Co.: Thompson (Z), 61  
   Grand Isle: Shimer, 02a  
   Lake Champlain region: Kemp, 93d  
   Shelburne: Hitchcock (E), 61b  
   Summit, camptonite: Nason, 89c  
 Virginia: Darton, 97c, 98b, 10c  
   Highland Co.: Darton, 90a  
   middle western: Watson, 13c  
   Richmond Basin: Shaler, 99a  
   Shenandoah Valley: Watson, 13c  
   Washington, Blewett district: Weaver, 11  
   West Virginia, Pendleton Co.: Darton, 90a  
 Dimetrodon: Case, 05a; brain cavity: Case, 97; fore foot: Case, 04a; skull: Case, 04



Dimetrodon incisivus: Case, 10c, 15b  
 Dinichthys. *See* Pisces.  
 Dinictis: Lucas (F A), 98a; Scott, 89b  
 Dinocerata: Marsh, 72m, 73a, d, 76, 86; Osborn, 81;  
     Owen (R), 76; Scott, 86  
 Dinocyon, Miocene, Texas: Matthew (W D), 02a  
 Dinosaur footprints, Arizona: Riggs, 04a  
 Dinosaur-turtle analogy: Wieland, 12a  
 Dinosauria. *See* Reptilia.  
 Diplodocus. *See* Reptilia.  
 Diopside and its relations to calcium and magne-  
     sium metasilicates: Allen (E T), 09  
 Diopside and related minerals: Day (A L), 09  
 Dip, determination of: Moon, 13; graphic method:  
     Cameron, 13  
 Dip, projection of, graphic method: Palmer (H S),  
     18  
 Dip and pitch: Raymond (R W), 08, 09a  
 Dip chart: Bancroft (H), 14a; Linforth, 14; Simons,  
     14  
 Dip protractor: Wentworth, 17  
 Diplacodon, Utah: Hatcher, 95  
 Diplocaulia: Moodie, 12  
 Diplocaulus: Williston, 09; structure and relation-  
     ship: Douthitt, 17a  
 Diploceras, Uinta Eocene: Peterson, 14  
 Dips, anomalous: Shaw (E W), 18d  
 Discinocaris: Clarke (J M), 02f  
 Discoliths: Edwards (A M), 93  
 Discosaurus: Leidy, 70v  
 Diseased bones, Mesozoic: Moodie, 16c  
 Disintegration of rocks and consequences: Hunt,  
     75f  
 Dislocations. *See* Faulting.  
 Dissorophus, Texas Permian: Cope, 95i; synonymy:  
     Moodie, 08c  
 Distribution. *See* Geographic distribution.  
 District of Columbia.  
     General: Darton, 01; Shattuck, 07c  
*Historical geology.*  
     General: Darton, 96d; McGee, 86, 91c  
     Pensauken (?) formation: McGee, 00b  
     Potomac formation: Knowlton, 89a; Sinnott, 16  
     Section at shaft of waterworks: Robinson  
         (Thomas), 85  
*Mineralogy.*  
     General: Merrill (G P), 85b  
     Prochlorite: Merrill (G P), 84  
*Paleontology.*  
     Buried drift wood: McGee, 83e  
*Petrology.*  
     Crystalline schists: Merrill (G P), 83b  
     General: Merrill (G P), 85b  
     Igneous and metamorphic rocks: Fenner, 17  
*Physical geology.*  
     Boulders of decomposition: Spencer (J W), 85a  
     Disintegration of granitic rocks: Merrill (G P),  
         95c  
     Seismographic Station, registration: Tondorf,  
         17  
*Physiographic geology.*  
     General: Darton, 96j, 98c; McGee, 91c, 98;  
         Wherry, 17c  
*Underground water.*  
     General: Clark (W B), 18a; Darton, 96d, 05f

Ditney folio, Ind. (no. 84): Fuller, 02  
 Dolichorhinus, Uinta beds: Peterson, 14c  
 Dolomite.  
     Alabama, Birmingham quadrangle: Butts, 07;  
         Montevallo, Shelby Co.: Butts, 11c  
     Alberta, Waterton: Daly (R A), 17d  
     Analyses: Knight (N), 04a  
     Big Horn dolomite, Wyo., origin: Black-  
         welder, 13b  
     Dolomite, decomposition: Knight (N), 08  
     Evolution: Steidtmann, 11  
     General: Hunt, 58, 67g; Weller, 11  
     Iowa: Knight (N), 01, 04, 14  
     Mottled limestones, origin: Van Tuyl, 16c  
     Ontario, Nipissing district: Davis (H P), 11  
     Origin: Dale, 14; Dana (J D), 95; Davis (N B),  
         11; Farrington, 14a; Hall (C W), 95;  
         Hunt, 59d, 60b, 62b, 67f, g; Loughlin, 16b;  
         Skeats, 18; Stebinger, 16; Steidtmann, 11,  
         17; Van Hise, 04; Van Tuyl, 14a, 15, 15a,  
         b, 16, 16a, b, c; Wallace (R C), 13a  
     Quebec: Hunt, 59  
     Tennessee, Johnson Co.: Jenkins, 16  
 Dolomitic clay, Texas: Ries, 17a  
 Dolomitization: Steidtmann, 16; Walcott, 14;  
     Wallace (R C), 13, 14; depth: Van Tuyl,  
     18a  
 Dome structure: Arnold, 07a; Sierra Nevada:  
     Gilbert, 04d  
 Dome theories in Gulf coast geology: Harris, 12a;  
     Lucas, 12a  
 Domes.  
     Coastal salt domes: Harris, 08, 08c, 09; Ken-  
         nedy, 17  
     New York, exfoliation domes: Miller (W J), 11a  
 Dominica.  
     General: Endlich, 80; Guppy, 69; Sapper, 03g  
*Historical geology.*  
     General: Spencer (J W), 02  
*Petrology.*  
     Volcanic dust: Wadsworth, 80d  
*Physical geology.*  
     Boiling lake: Hovey, 06i  
 Dominican Republic.  
     Amber: Sample, 05  
     General: Gabb, 71, 71a, 73, 10  
     Samana: Adam, 71  
*Economic geology.*  
     Copper: Garrison, 07b; San Cristobal: Donnel-  
         ly, 15  
     General: Blake (W P), 71a; Fernández, 62; Gar-  
         rison, 15; Haupt, 43; Marvinne, 71  
     Gold: Courtney, 60; Garrison, 05, 07; Roth-  
         well, 82  
     Iron: Brinsmade, 18  
     Mineral resources: Kempton, 09  
     Petroleum: Gabb, 72  
     Salt: Ruschhaupt, 69  
*Historical geology.*  
     General: Bergt, 98; Fernández, 62; Haupt, 43;  
         Maury, 17  
     Tertiary: Conrad, 52; Heneken, 53; Moore  
         (J C), 50  
     Yaqui Valley: Maury, 18  
*Mineralogy.*  
     General: Garrison, 15



## Dominican Republic—Continued.

*Paleontology.*

Corals: Lonsdale, 53

General: Gabb, 73; Maury, 17, 18

Mollusca, Miocene: Gabb, 73a

Oligocene: Pilsbry, 17

Pleistocene, Sierra Nueva: Vanatta, 14

Tertiary: Sowerby, 50

Mollusca and fish: Moore (J C), 53

Scaphopoda, Tertiary: Pilsbry, 98a

Dorudon: Agassiz (L), 48; Gibbes, 45, 48a

Douglas oil and gas field, Wyo.: Barnett, 14; Jamison, 12

Dover folio, Del.-Md.-N.J. (no. 137): Miller (B L), 06

Downieville folio, Cal. (no. 37): Turner, 97

Downwarping along joint planes: Burling, 17

Dragoon tungsten deposits, Ariz.: Richards (R W), 08

Drainage, relation to faults: Hobbs, 01

## Drainage changes.

Abandoned valleys, Ohio basin: Campbell, (M R), 01a

Black Hills and Big Horn Mountains, post-Pleistocene drainage modifications: Mansfield, 06

California: Jacobs, 77

Calaveras Co.: Storms, 94

Forest Hill Divide: Browne (R E), 90

gravel channels, ancient: Storms, 05

Neocene rivers: Lindgren, 93, 03a

river beds, old: Le Conte, 80

Russian and Sacramento rivers: Holway, 07a

Santa Clara Valley: Branner, 07

Sierra Nevada: Alling, 14

Taylorsville region: Diller, 06a

Canada, northern, preglacial river: Bell (R), 95b

Ottawa River: Ells, 01e

St. Lawrence, preglacial tributary: Poole, 03c

Chattanooga district: Hayes, 99e

Cincinnati region: James (J F), 88a

Colorado plateau province: Gilbert, 76a

Connecticut, Cheshire: Ward (F), 14; Connecticut Valley: Dana, 83b

Fort Wayne region, Spy Run Creek, abandoned meanders: Price (J A), 01a

Freshwater faunas, distribution, as evidence: Johnson (D W), 05a

General: Abbe, 99; Campbell (M R), 96b; Davis (W M), 84; Scheffel, 09

Georgia, Tallulah district: Johnson (D W), 07, 07c

Great Lakes, drainage into Mississippi River: Spencer (J W), 94f

Great Lakes region: Leverett, 10a; Taylor (F B), 08; Upham, 94i

Illinois, Danville region: Wegemann, 09

Illinois Valley: Sauer, 16

Kankakee Valley: Montgomery (H T), 99

northwestern: Carman, 09

Rock River basin: Leverett, 93c

Springfield area: Jones (J C), 08

western: Leverett, 92c

Indiana: Leverett, 15

Bartholomew Co.: Elrod, 82

Big Creek and tributaries: Culbertson, 08

eastern: Beachler, 94; Bownocker, 99

## Drainage changes—Continued.

Indiana: Kankakee Valley: Montgomery (H T), 99

northern: Montgomery (H T), 99a

Richmond: Moore (J), 93b

Spencer Co.: Veatch (A C), 98a

Tippecanoe River: McBeth, 10

Vigo Co.: Scovell, 97

Intercession, a drainage modification: Goldthwait, 08b

Iowa: Lees, 14; Leighton, 17

Central: Keyes, 07g

Des Moines Co.: Fultz, 96a

eastern: Carman, 09; Leverett, 92c, 97e

Lee Co.: Keyes, 95c

Madison Co.: Tilton, 97

Platte River: Todd, 80a

southeastern: Gordon (C H), 95; Leverett, 01,

Kansas: Todd, 09a

Kaw Lake area: Todd, 18a

Wakarusa Creek: Todd, 11a

Kentucky, Louisville, Bryson, 90

Lake Erie, preglacial outlet to Lake Ontario, Spencer (J W), 81, 08d

Lake Manitoba, ancient outlet: Treherne, 81

Lake Michigan, former outlet: Davis (W M): 94c

Lake Superior outlet: Winchell (N H), 71

Lake Winnipeg, discharge: Dana (J D), 82a

Massachusetts: Kemp, 15b

Charles River: Clapp (F G), 01

Connecticut Valley: Jefferson, 98

Nashua Valley: Crosby, 99a

Michigan: Cooper (W F), 07; Gordon (C H), 98; Mudge, 97, 00; Leverett, 15

Ann Arbor quadrangle: Russell (I C), 08

Eagle River: Whittlesey, 83, 85

lower: Lane, 01a

Minnesota, Hennepin Co.: Winchell (N H), 93g

Mankato: Bechdolt, 89

Minneapolis: Soper, 15

Minnehaha Falls: Grant (U S), 90

Saint Anthony Falls: Sardeson, 08

Mississippi River, between Lansing and Dubuque: Calvin, 07

between the Missouri and the Ohio: Fowke 08

lower rapids: Leverett, 99c

Mississippi Valley: Clem, 11; Leverett, 95b; Tiffany, 92; Tight, 07a; upper: Upham, 98c; Warren (G K), 68

Missouri, Kansas City area: West, 79

Montana, Missouri River: Bauer, 15; Shonkin Sag: Weed, 95d; northeastern: Collier, 18a

Nebraska, northeastern: Todd (J E), 12

Todd Valley: Condra, 03b

New Brunswick, St. John River: Matthew (G F), 94d

New Jersey, Delaware Water Gap: Walter, 95

Passaic quadrangle: Darton, 08b

New Mexico, Rio Mora: Keyes, 10m

New York: Fairchild, 09c; Kemp, 15b

Adirondack Mountains: Alling, 16; Miller (W J), 17a; south and west of the Adirondacks: Fairchild, 09c

Bronx River: Kemp, 96g, 97c



## Drainage changes—Continued.

New York: Catatonk Valley: Mills (F S), 03a  
 central: Carney, 04; Fairchild, 04d, 09, 09d;  
 Grabau, 08b; Tarr, 05b  
 central-western: Grabau, 08f  
 Champlain and Hudson valleys: Woodworth, 05a  
 eastern: Cook (J H), 09; Wright (G F), 95a  
 Fall Creek region: Carney, 03  
 Finger Lake region: Lincoln, 92; Rich, 08  
 Genesee Valley: Fairchild, 08; Grabau, 94, 07e; Whitbeck, 02  
 glacial Lake Bloomfield: Dryer, 08a  
 glacial waters, Oneida to Little Falls: Fairchild, 04b  
 Hudson and Champlain valleys: Peet, 04  
 Hudson Gorge: Rogers (G S), 10  
 Hudson River: Fairchild, 11; Kemp, 11f; Miller (W J), 11  
 Hudson Valley, lower: Berkey, 06a  
 Hudson Valley, upper: Fairchild, 17  
 Iroquois extinction: Fairchild, 07g  
 Niagara Gorge: Upham, 01  
 Niagara region: Currie, 01; Hovey (H C), 86; Pohlman, 86b  
 Niagara River: Scovell, 89, 91; Spencer (J W), 10b; Wright (G F), 84b  
 overflow channel of ponded pre-Wisconsin waters: Carney, 08  
 Poughkeepsie quadrangle: Gordon (C E), 11  
 pre-Iroquois channels: Fairchild, 03b  
 Schenectady quadrangle: Stoller, 11  
 southeastern: Berkey, 11; Kemp, 08c  
 Syracuse region: Hopkins (T C), 10  
 Tertiary drainage: Grabau, 10b  
 Tompkins Co.: Hausman, 18  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 western: Gilbert, 97b  
 Nipissing-Matawa River: Taylor (F B), 97d  
 North America, eastern: Grabau, 09b  
 North Dakota, Jamestown-Tower district: Willard, 09  
 Maple River: Willard, 06e  
 western: Leonard, 16  
 Ohio: Carney, 11b; Coffey, 14; Fowke, 00; Leverett, 91; Tight, 94; Wright (G F), 83  
 Camp Sherman region: Campbell (M R), 18  
 Cincinnati region: Fowke, 98, 00a; James (J F), 88a  
 Cuyahoga River: Claypole, 92f, h  
 Cuyahoga Valley: Pierce, 97; Upham, 96a, b  
 Fairfield Co.: Hyde, 12; Tight, 97a  
 Jonathan Creek basin: Davis (H J), 99  
 Knox, Licking, and Coshocton cos: Clark (W B), 02  
 Lakeville: Hubbard (G D), 08c  
 Lancaster: Hyde, 04  
 Licking Co.: Carney, 09; Mather, 09; Scheffel, 09; Tight, 94a; Moot's Run area: Nixon, 13  
 Little Miami River: Bownocker, 00  
 Miami and Kentucky rivers: Fenneman, 12  
 Pike Co.: Tight, 95  
 Rocky River: Gould (D T), 87  
 Ross Co.: Fowke, 95  
 St. Louisville: Clark (H), 11  
 southeastern: Tight, 00b, 03

## Drainage changes—Continued.

Ohio: southern: Leverett, 97c; Tight, 97  
 southwestern: Fenneman, 14a; Fowke, 01; Miller (A M), 01; Tight, 01  
 Spring Valley gorge, origin: Scheffel, 07  
 Washington Co.: Tight, 00  
 Wayne Co.: Todd (J H), 00  
 western: Bownocker, 99  
 Ohio basin, upper: Chamberlin, 94d  
 Ohio River: Tight, 98  
 Ohio River basin: Leverett, 97d  
 Oklahoma, Canadian River: Taff, 99b  
 Ontario, Lake Ontario, western part: Spencer (J W), 82a  
 Mattawa Valley: Taylor (F B), 97f  
 Montreal River: Bell (R), 10a  
 southwestern: Taylor (F B), 09  
 Pennsylvania: Hice, 12; Kemp, 15b; Ortmann, 12  
 Armstrong Co.: Lesley, 80c  
 Beaver River: Hice, 03  
 Delaware Water Gap: Walter, 95  
 Newport Creek buried valley: Ashburner, 86f  
 northern: Williams (E H), 02  
 Susquehanna River: Darton, 13a, 14  
 western: Chamberlin, 94e; Foshay, 90; Hice, 09; Leverett, 91  
 Wyoming Valley: Corss, 00a, 04; Griffith, 01; Hill (F A), 86  
 St. Clair and Detroit rivers, former distributaries: Taylor (F B), 12b  
 St. Croix River: Upham, 96n  
 South Carolina, Tallulah district: Johnson (D), 07, 07c  
 South Dakota: Todd (J E), 02; southeastern: Todd (J E), 12  
 Southern Appalachians: Hayes, 00b  
 Tennessee, eastern: White (C H), 04  
 Tennessee River: Simpson (C T), 00  
 Texas, central: Tarr, 90e  
 Unionidae, distribution: Simpson (C T), 00  
 Virginia, Shenandoah Valley: Watson, 13e; southwestern: Campbell (M R), 94b  
 Washington: Keyes, 17h; Willis, 87  
 West Virginia, Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Wisconsin: Knapp (J G), 72  
 Devil's Lake and Baraboo: Salisbury, 97a; Devil's Lake region: Eaton (J H), 72  
 Drift deposits. *See also* Glacial geology.  
 Alberta: Coleman, 10c; Tyrrell, 90a; southwestern: Dawson (G M), 95d  
 Alkali spots of drift sheets: Willcox, 05  
 Angular gravel: Chamberlin, 84  
 Boulder, Pittsburgh, Pa.: Gresley, 96a  
 Boulder belts and boulder trains: Chamberlin, 90a  
 Boulder clays, microscopic structure: Dawson (G M), 85a  
 Boulders: Christy, 48a  
 Canada: Bigsby, 51; Dawson (J W), 71a; Lyell, 43; Richardson (R), 84; Robb, 62  
 Channeled drumlin: Fairchild, 00d  
 Channels, glacial origin: Barton, 94  
 Character and source of drift: Burbank, 74



**Drift deposits—Continued.**

Characteristics: Salisbury, 94c  
 Cincinnati region: Drake, 25  
 Classification: Chamberlin, 91d; McGee, 79b; Newberry, 70h; Woodworth, 99; Whelp-ley, 45; of stony drift clays: Chamberlin, 84a  
 Connecticut: Dobson, 26  
 Connecticut Valley: Hitchcock (E), 23  
 Delaware: Chester (F D), 83, 83a  
 Delaware Valley: Salisbury, 93b  
 Distribution and origin: Davis (W M), 84a  
 Diversity along boundary: Upham, 94f  
 Drumlin, osar, and kame formation, horizon: Chamberlin, 93a  
 Drumlins and marginal moraines: Upham, 95c  
 Englacial and subglacial drift: Upham, 91d  
 Englacial drift: Chamberlin, 93b; Crosby, 96; Upham, 94b; distribution: Upham, 91c; Long Island: Bryson, 92  
 Eolian loess: Todd, 18b  
 Erratics: Ljungstedt, 10  
 Extra-morainic boulder clays: Lewis, 87  
 Extra-morainic till, origin: Todd, 90  
 False bedding: Spurr, 94b  
 Formation: Winchell (N H), 81c  
 Fossils in drift: Desor, 48b  
 Frozen streams of the Iowa drift border: Wil-son (A G), 96  
 General: Chamberlin, 83b; Couthouy, 42a; Donnelly, 83; Hall (J), 43i; Hayes (J L), 43; Hilgard, 67a; Hitchcock (E), 43; Jackson, 43c; Nicollet, 43b; Norton, 13; Reagan, 08a; Stone (G H), 81b  
 Glacial boulders: Hubbard (G D), 11  
 Great Lakes region: Spencer (J W), 90a; Whit-tlesey, 51a  
 Gumbo, Iowa: Kay (G F), 16d  
 High-level drift: Lesley, 82b  
 Idaho, Salmon River Range: Stone (G H), 93b  
 Illinois: Bliss, 65; Claypole, 82; Hershey, 97d; McGee, 79b; Worthen, 90  
 Chicago: Andrews (E), 67  
 Wheaton quadrangle: Trowbridge, 12  
 Indiana: Thompson (M), 89  
 Montgomery Co.: Beachler, 93  
 north-central: Capps, 10b  
 Interglacial deposits: Upham, 95e  
 Iowa: McGee, 79b  
 Cedar Rapids region: Shipton, 14  
 Davenport: McWhorter, 82; Pratt (W H), 82a  
 Des Moines region: Keyes, 92 m; loess: McGee, 82  
 Des Moines-Allerton section: Tilton, 13a  
 interloessial till, Sioux City: Todd, 95a  
 loess at Muscatine: Witter, 90  
 northeastern: McGee, 78, 91  
 northern: Webster, 90; constituents: Web-ster, 05d  
 Oelwein: Finch (G E), 97  
 Tama Co.: Savage, 01  
 Union Co.: Savage, 04  
 Kames, eskers, and moraines, derivation: Upham, 94b  
 Kansas: Broadhead, 04b; Knox, 74; Topeka: Wooster, 13

**Drift deposits—Continued.**

Lake Superior region: Desor, 51c, e; Shepherd, 47a  
 Local origin of glacial drift: Salisbury, 00a  
 Maine: Stone (G H), 90; osar gravels of coast: Stone (G H), 93  
 Manitoba: Tyrrell, 90a; near Winnipeg: Up-ham, 10  
 Massachusetts: N., 25  
 Boston area: Stodder, 46; Upham, 79a, 93e  
 Cambridge: Agassiz (L), 50b  
 Cape Ann: Shaler, 89b  
 Charles River basin: Clapp (F G), 04  
 eastern: Desor, 52g; Upham, 89a  
 Gloucester: Shaler, 66d  
 Groveland: Mudge, 62c  
 Middlesex Co.: Barton, 89  
 Richmond boulder trains: Benton, 78; Desor, 47c; Hitchcock (E), 44c, 45a; Perry, 71b; Reid (S), 45; Rogers (H D), 45a; Taylor (F B), 10b  
 Salem: Pickering, 71  
 Westfield: Diller, 77  
 Michigan, Lake Superior region: Desor, 50e  
 Lower Peninsula: Winchell (A), 76  
 Mason: Wooster, 11  
 St. Clair tunnel: Adams (F D), 92  
 Minnesota: Upham, 84f, 11  
 Minneapolis area: Upham, 11a  
 Rice Co.: Sperry, 78  
 Saint Paul: Upham, 97a  
 Minnesota, Dakotas, and Manitoba, in glacial and superglacial drift: Upham, 10a  
 Mississippi Valley: Chamberlin, 93; Salisbury, 91c; upper: White (C A), 68b  
 Missouri, central: Spencer (J W), 87d  
 St. Louis area: Drushel, 11  
 western: Broadhead, 04b  
 Mode of accumulation: Hay (O P), 87  
 Nebraska: Barbour, 13c; Kansan drift: Bar-bour, 14g  
 New England: Desor, 47a; Hitchcock (C H), 77b; till: Upham, 79c  
 New Hampshire: Hitchcock (C H), 78a; Up-ham, 78  
 New Jersey: Britton (N L), 87b; Salisbury, 91d; extra-morainic drift: Wright (A A), 92  
 New York: Eaton (A), 27  
 Albany region: Eights, 52  
 east central: Rich, 14  
 Long Island: Bryson, 95a, 98; Fuller, 14; Merrill (F J H), 86; boulder-like masses of clay: Lewis (E), 73; Hempstead plains: Bryson, 97  
 Newburgh: Dwight, 85  
 New York City: Stevens (R P), 72  
 Niagara River region: Spencer (J W), 10b  
 Portage: Hall, 43h  
 Rochester: Fairchild, 95b  
 Schenectady quadrangle: Stoller, 11  
 Seneca Co.: Lincoln, 97  
 Staten Island: Britton (N L), 87b, 88b; Hollick, 93e, 99, 00a  
 southeastern: Mather, 43  
 Sullivan Co.: Thompson (W A), 33  
 Third district: Vanuxem, 42  
 Thousand Islands region: Cushing, 10a



## Drift deposits—Continued.

- New York: western: Fairchild, 96b; Hall, 43g; Johnson (L), 82; kettle in glacial lake delta; Fairchild, 98b  
 Wilson, boulder pavement: Gilbert, 98b  
 Nicaragua: Belt, 74; Dana (J D), 74a  
 Northwest: Winchell (N H), 73d  
 Nova Scotia: Bailey (L W), 96b; Dawson (J W), 48a; Goldthwait, 14d  
 Ohio: Claypole, 82; Orton, 88g; Whittlesey, 48 boulders: Tappan, 28  
 Cincinnati: Burke, 88  
 northwestern: Winchell (N H), 73c  
 southwestern: Leverett, 93b  
 Ontario: Coleman, 88  
 central: Coleman, 91  
 Rainy River district: Johnston (W A), 15  
 St. Clair tunnel: Adams (F D), 92  
 Origin: DeKay, 28; Rogers (H D), 50e  
 Pebbles of clay in stratified gravel and sand: Winchell (N H), 94f  
 Pennsylvania: Foshay, 91; Northampton Co.: Prime, 79a  
 Precious stones in drift: Muenburg, 14  
 Quebec, Little Metis, boulder drift: Dawson (J W), 86c  
 Montreal region: Stansfield, 14, 15  
 Rhode Island, Block Island: Rand, 90  
 Queen's River moraine: Woodworth, 96b  
 Sand plains: Davis (W M), 90  
 Saskatchewan: Tyrrell, 90a  
 Stratification: Chamberlin, 84  
 Stratified drift: Salisbury, 96c  
 Superglacial drift: Salisbury, 94b  
 Till, formation of: Hershey, 97d; sublacustrine: Upham, 96j  
 Vegetable remains, Illinois: Bliss, 65  
 Virginia, Richmond: Wallace (C M), 76  
 Wisconsin, Devil's Lake and Baraboo: Salisbury, 97a  
 Grantsburg: Berkey, 65  
 St. Croix region: Chamberlin (R T), 10a  
 southeastern: Alden, 65  
 Washington: Upham, 04e; Olympia: Rogers (G O), 93

Drift pebbles, leaching of: Udden, 13b

Driftless Area, Calhoun Co., Ill.: Salisbury, 91b;  
 Upper Mississippi Valley: Chamberlin, 85a; Sardeson, 97b

Drill cores, specific weight: Lane, 16b

Dromomeryx: Douglass, 09b

Drumlinoids: Hubbard, 06

## Drumlins.

- Accumulation, mode: Upham, 92a, 95d  
 Distribution: Upham, 95c; and origin: Taylor (F B), 07a  
 General: Davis (W M), 84c; Reagan, 08a  
 Madison type: Upham, 94l  
 Michigan: Russell, 06b, 07b  
 Grand Traverse region: Leverett, 05a, 06  
 northern: Russell, 05e  
 Modified drift: Upham, 97f  
 New York, Auburn-Genoa quadrangles: Luther, 10; central western: Fairchild, 07a  
 Nova Scotia, Cow Bay: McIntosh, 16

## Drumlins—Continued.

Origin: Alden, 05, 11; Fairchild, 07f, 11a; Millis, 11; Shaler, 98b; Tarr, 94b; Upham, 93f

Radiation of glacial flow a factor in formation: Alden, 11; Fairchild, 11

Structure: Upham, 89c; and origin: Fairchild, 07f

Dryness of sandstone beds, cause: Johnson (R H), 18

Drysdale, C. W., biography: Bancroft (J A), 18; Jacobs (E), 17; Williams (M Y), 18

Ducktown region, Tenn.: Emmons (W H), 11b

Duluth gabbro: Grout, 18b

Duncan Creek district, Yukon: Keele, 05

Dune sands: Shaler, 94c

## Dunes.

California, Monterey: Campbell (M R), 15a

Clay dunes: Coffey, 09

Colorado, San Luis Valley: Ingersoll, 75

Delaware, Lewes: Martin (D S), 71b; Rothrock, 89

Formation: Baker (H P), 06; Lewis (E), 76

General: Carman, 09; Free, 11; Shaler, 94c; Townsend, 13

Indiana: Bailey (E S), 17; Barrett, 17; Shannon, 12a

Lake Superior region: Desor, 50d; Schoolcraft, 43

Minnesota, eastern: Hall (C W), 99a

North Carolina coast: Cobb, 04a, 06

Nova Scotia: Bailey (L W), 96b

Sand formation on marine coasts: Olsson-Seffer, 10

Sand waves: Willey, 08b

United States: Hitchcock (A S), 04

Dunkleberg mining district, Granite Co., Mont: Pardee, 17a

Duquoin district, Ill.: Udden (Jon A), 09

Durango coal field, Colo.: Taff, 07

Durango-Gallup coal field: Schrader, 06; Shaler (M K), 07a, b

Dust: Pumpelly, 79

Dust fall, March 9, 1918: Winchell (A N), 18

Dutch West Indies: Martin (K), 88

Dutton, C. E., biography: Becker, 12; Diller, 11b, 13

Dwarf faunas: Shimer, 08

Dwight, W. B., biography: Merrill (F J H), 08

Dynamic and structural geology. *See* Physical geology.

Eagle River region, Alaska: Knopf, 11b, 12

Earlington quadrangle, Ky.: Crider, 14a

## Earth.

Age: Becker (G F), 08, 10; Claypole, 00a; Hixon, 06a; Joly (J), 01; Kelvin, 98; King (C), 93; Lane, 08f; McGee, 93d; Shelton, 10; Templin, 85; Upham, 93c; Walcott, 93

evolution, evidence from: Matthew (W D), 14a

radioactivity, evidence of: Becker (G F), 08a; Day (A L), 08

Atmosphere: Chamberlin (T C), 07e; Carboniferous: Rogers (H D), 44a; primeval: McKee, 06



## Earth—Continued.

- Axis, inclination: Warring, 76; change of: Bereman, 91
- Crust: Holland, 14; Powell, 84b; Walling, 79  
cause of shrinkage: Taylor (W B), 86  
composition: Clarke (F W), 06; Schioetz, 01  
continents and oceans, origin: Love, 08  
crumpling of: Taylor (W B), 85  
deep-sea circulation: Chamberlin (T C), 06  
failing structure: Hayford, 07  
history of the earth: See, 09  
level of no strain: Claypole, 90d  
meteorites, composition: Merrill (G P), 09b  
movements: Le Conte, 97  
rocks, limiting strength: King (L V), 12  
strength: Barrell, 14a; Gilbert, 90b  
thickness: Rogers (W B), 59
- Features: Shaler, 03
- Figure: Bowie, 14; Green (W L), 57; Hayford, 10; Keyes, 01j  
faceted form of a collapsing geoid: Keyes, 18g  
plan: Taylor (F B), 10
- Genesis: Barrell, 18; Blake (F L), 06; Chamberlin (T C), 99b, 00d, 01c, 04b, 05, 06a, 16, 16a, 18, 18a; Coleman, 05b; Dutton, 76; Frazer, 05; Hitchcock (C H), 74i; Kelvin, 99; Lees, 17a  
contractional hypothesis, criticism of: Dutton, 74  
geologic periods, cause: Taber (C A M), 07  
mass, secular increase: Winchell (A), 83a  
moon, place of origin: Pickering, 07  
nebular and planetesimal theories: Upham, 05  
ocean, chemical evolution: Lane, 06d  
ocean basins, origin: Hobbs, 07f  
pendulation theory: Wherry, 08b  
physics of the earth: See, 08  
planetesimal hypothesis: Chamberlin (T C), 04, 05, 15a, 16; Kemp, 08; Lees, 17a  
radioactivity, bearings on geology: Chamberlin (T C), 12  
sedimentary rocks, origin and age: Schaeberle, 08b  
segmentation of earth: Chamberlin (T C), 14b  
uranium and geology: Joly, 08
- Growth by accretion: Chamberlin (T C), 07b
- Interior: Abbe, 92; Bownocker, 99a; Carter, 09; Chamberlin (T C), 04b, 05, 15; Claypole, 88c, 90; Dana (J D), 73e; Davis (W M), 90c; Day (A L), 16a; Gregory, 08; Haskins, 69; Hayford, 15; Iddings, 14; King (F H), 86; Kittredge, 76; Klotz, 08; Lane, 95a, 06c, 15a; Le Conte (J), 89; Powell, 84a, b; Reid (H F), 15; Sayles, 88; Schlesinger, 15; Seamon, 94; Shaler, 66c, 68; Wicchert, 09; Woodward (R S), 92, 95  
heat, internal: Mudge, 78b  
sections on fortieth parallel: Hitchcock (C H), 76c  
solidity, evidence of: Wadsworth, 84b  
zone of flow, depth: Adams (F D), 12
- Rigidity: Becker (G F), 90; Hoskins, 06; See, 06c
- Rotation, former rates: Chamberlin (T C), 07d; influence of tides upon: Chamberlin (T

## Earth—Continued.

- C), 08a; bearing on deformation: Chamberlin (T C), 09
- Temperature: Becker (G F), 08; Bishop, 96; Chamberlin (T C), 11a; Joly, 08; Lane, 08f; See, 07
- borings, temperature in: Koenigsberger, 11; Van Orstrand, 18
- Dakota, artesian wells: Darton, 98a
- Ohio, Findlay: Johnston (J), 13
- oil field temperatures: DeGolyer, 18a; Höfer, 12
- Pennsylvania, McDonald well: White (I C), 18; West Elizabeth well: Watson, 11c
- West Virginia, Clarksburg well: White (I C), 18; Wheeling well: Hallock, 91, 94
- Calumet, Mich.: Agassiz (A), 95b
- Comstock Lode: Church, 79b
- geothermal gradient: Lane, 02f; Winchell (A N), 11c; Michigan: Lane, 00b, 02m
- geothermic gradients and petroleum: Shaw (E W), 12a
- Lake Superior copper mines: Wheeler, 86
- subterranean temperatures and gradients: Gilbert, 03b, 05, 05a
- transmission of heat into earth: Lane, 05c
- underground temperatures: Watson, 11b; list of: Darton, 11b
- Virginia, eastern, coal mines: Rogers (W B), 42c, 43c
- Earth as a heat engine: Becker (G F), 15a
- Earth as a heat-radiating planet: Schaeberle, 08
- Earth flow, Gros Ventre slide: Blackwelder, 12b
- Earth flows of San Francisco earthquake: Anderson (R), 08
- Earth movements. *See* Changes of level; Landslides.
- Earth runs, Seward Peninsula, Alaska: Smith (F S), 10
- Earth structure, growth of knowledge of: Barrell 18a
- Earthquakes. *See also* Seismology.
- Alabama, October 18, 1916: Finch (R H), 16a; Hopkins (O B), 16a
- Alaska: Perrey, 66  
Yakutat Bay: Tarr (R S), 12b  
1899: Martin (L), 10b
- Antilles: Montessus, 02
- Appalachians, southern, February 21, 1916: Taber, 16b
- Arizona, 1912: Tolman, 12c
- Bridges, damage to: Hobbs, 08
- California: Blake (J), 70; Blake (W P), 54b, 56g; Montessus de Ballore, 09; Mulholland, 18; Reid (H F), 10b,c; Shaler, 70d; Wolff, 08; Wood (H O), 10, 12, 12a,b,c, 16a
- after-shocks: Kiess, 12
- central, Nov. 8, 1914: Davis (E F), 15
- Imperial Valley, June 22, 1915: Beal, 15a
- Kern River: Clayton, 70
- Los Alamos, 1915: Beal, 15
- Owens Valley: Hobbs, 10f; Rockwood, 72a; Whitney, 72b; 1872: Johnson (W D), 08
- registration at Berkeley and Lick Observatory: Davis (E F), 13
- San Bruno: Davis (E F), 14
- San Francisco. *See* California physical geology, p. 72



## Earthquakes—Continued.

- California: San Jacinto: Claypole, 00; Rolfe, 18; Townley, 18; 1899: Daneš, 07; April 21, 1918, aftershocks: Hamlin, 18a  
 Santa Barbara channel: Mattei, 17  
 Santa Cruz Mountains: Beal, 14  
 southern: Hamlin, 18; Wood (H O), 18; and eastern: Hamlin, 17  
 Tejon Pass, 1916: Branner, 17a  
 1800-64: Trask, 64a  
 1812-1855: Trask, 56a  
 1856: Trask, 57  
 1857: Trask, 58; January 9: Trask, 57a  
 1858-9: Trask, 60  
 1860: Trask, 63  
 1863: Trask, 64  
 1864: Trask, 66  
 1865: Trask, 66a  
 1872, effects in Yosemite Valley: Muir, 72  
 1888: Holden, 89  
 1889: Keeler, 90  
 1890-1: Holden, 92  
 1892: Perrine, 93  
 1893: Perrine, 93a  
 1894: Perrine, 95  
 1895: Perrine, 96  
 1896-7: Perrine, 98  
 1897-1906: McAdie, 07  
 1898: Leuschner, 98  
 1898: Perrine, 99  
 1911, July 1: Templeton, 11; Anon, 11c  
 1915: Palmer (A H), 16; October 7: Davis (E F), 15a  
 1916: Palmer (A H), 16  
 1917: Palmer (A H), 18  
 Canada: Klotz, 10c; Perrey, 50; Stupart, 05  
 catalog: Dawson (J W), 60d  
 1860, October: Dawson (J W), 60d  
 1861, July 12: Dawson (J W), 61e  
 1870, October 20: Dawson (J W), 70b  
 1877, November 4: Dawson (J W), 77f  
 1877-1882: Rockwood, 83  
 1879-1894: Dawson (J W), 94g  
 1894-1897: McLeod, 97  
 Catalog, 1872-3: Hayes, 75  
 Cause: Geldern, 89; Hixon, 05a, 11; Hobbs, 09; Hovey, 09a; Lake, 75; Maury, 90; Powell, 86a; Reid (H F), 12g; Thayer, 86  
 Central America: Bertrand, 99; Montessus de Ballore, 84, 88, 98; Perrey, 47  
 Charleston, S. C., August 31, 1886: Claypole, 88e; Cope, 86q; Davison (C), 05; Dutton, 87a, b, 89; Fuller, 06j; Harboe, 07; Hayden (E), 86, 86a; Hobbs, 07h; Hovey, 09a; Kemp, 02c; McGee, 86a; Meigs, 86; Mendenhall, 86, 87; Topley, 87  
 limits; O'Reilly, 86  
 line of origin: Starek, 86  
 speed of propagation: Newcomb, 88  
 Connecticut: Anon, 40a  
 Connection with volcanism: Heilprin, 06b; Kemp, 02c  
 Costa Rica: Alfaro, 11; Dutton, 91a; González Viquez, 10; Jaggar, 11, 11a; Jones (J O), 03; Pittier, 10; Tristán, 12  
 Cartago, 1910: Fernández, 10; May 4, 1910: Alfaro, 10

## Earthquakes—Continued.

- Costa Rica: Sarchí: Sapper, 12; Tristán, 12g  
 Toro Amarillo: Alfaro, 12  
 1888: Michaud, 12  
 1900: Tristán, 12d  
 1910-1911: Tristán, 12c  
 1911: Tristán, 12b, f  
 1912: Tristán, 12a  
 1916, February 27: Tristán, 16  
 Cuba: Salterain, 83; 1851-55: Poey, 55  
 Depth, determination: Dutton, 87b; Le Conte, 87a  
 District of Columbia, registration: Tondorf, 17  
 Earthquake sounds: Hayden (E), 86b  
 Effect on deep underground water circulation: Yeandle, 09  
 Effects in mines: Staunton, 18  
 Elastic-rebound theory: Reid (H F), 11  
 Energy of earthquakes: Reid (H F), 12f  
 Evidences of former earthquake shocks: Shaler, 94d  
 Focal depth: Dutton, 88  
 Forecasting: Gilbert, 09a  
 Frequency and cause: Perrey, 55  
 General: Billings, 56h; Branner, 13, 17; Brigham (W T), 68d; Carter, 09, 09a; Chittenden, 87; Deckert, 02a; Denison, 11; Du Commun, 29; Dutton, 04; Gill, 06; Haskins, 69; Hayden (E), 87; Heilprin, 06b; Hixon, 09; Hobbs, 07, 07b, c, e, j; Hunt, 70h; Jaggar, 10; Klotz, 07, 07b, 08, 10; Lea, 25; Milne, 86; Montessus de Ballore, 00; Newberry, 86, 87g; Owen (R), 72a, 85; Reid (H F), 09b; Rockwood, 72; Rogers (H D), 43a, 53b; See, 07, 07a; Shaler, 69, 69d; Tarr, 06f; Whitney, 71a; Wilson (J F), 10  
 Great Basin region: Gilbert, 83b, 84a  
 Guadeloupe, 1843: Sainte-Claire Deville, 60; 1845: Moreau de Jonnés, 46  
 Guatemala: Anderson (T), 08a; Ascoli, 09; Dollfus, 68; Jones (J O), 03; Rockstroh, 03  
 December 1917-January 1918: Anon, 18d  
 1895-6: Sapper, 97  
 1902, April 18: Omori, 07c; Sapper, 02  
 Haiti: Scherer, 12, 12a; 1911: Scherer, 11  
 Harvard seismographic station report: Woodworth, 09  
 Hawaii: Hitchcock (C H), 09; Lyman (C S), 59  
 seismic prelude, Mauna Loa eruption, 1914: Wood (H O), 15  
 1868: Wood (H O), 14a  
 Hawaiian Islands, Oahu: Alexander (W D), 71  
 Heave-fault slipping, cause: Wood (H O), 15a  
 Illinois, January 2, 1912: Udden (A D), 12  
 Intensity: Mendenhall (T C), 89; localized, explanation of: Branner, 11a; on surface and underground: Le Conte, 85  
 Iowa, April 9, 1917: Kay (G F), 17d  
 Jamaica, Kingston earthquake: Branner, 11a; Brown (C W), 07; Carden, 07; Cornish, 12; Davison (C), 06; Fuller, 07; Hall (M), 07, 07a, 09; Hovey, 09a; Marvin, 07; Mountmorres, 07; Spencer (J W), 07b; aftershocks: Milne, 10  
 Port Royal: Ellis, 92  
 Kentucky: Audubon, 31



## Earthquakes—Continued.

- Lines, earthquake: Storms, 06  
 Magnets, suspended, effects on: Reid (H F), 14  
 Maine, southeastern, 1904: Reid (H F), 11c  
 Martinique: Moreau de Jonnés, 59  
 Masaya: Sapper, 06  
 Mass movements in tectonic earthquakes and depth of focus: Reid (H F), 10a  
 Mexico: Adorno, 64; Aguilar, 91; Mex I G, 11; Montessus de Ballore, 00; Perrey, 47; Poey, 59; Ramírez, 73  
 catalog of earthquakes, 1904-1908: Aguilera, 09  
 Guadalajara: Ordóñez, 12, 12a  
 Guerrero: Böse, 04a, 11  
 Jalisco: Bárcena, 75a; Iglesias, 77; Matute, 75; June 7, 1911: Miranda y Marrón, 12  
 Mexico, Acambay-Tixmadeje: Urbina, 13  
 microseisms in 1911: Mex I G, 12  
 Oaxaca, Zanatepec: Böse, 03  
 seismic movements, 1911, 1912: Mex I G, 13a, 14  
 Sonora: Goodfellow, 87; MacDonald (B), 18; 1887: Aguilera, 88; May 3: Hunt, 87d  
 Volcano Lake: Anon, 16b  
 1866, January: Sartorius, 67  
 1879, May 17: Bárcena, 79  
 1887, May: Puga, 87  
 1890, December 2: Puga, 91  
 1907, April 14: Böse, 08; Marvin, 07a  
 1908: Miranda y Marrón, 09  
 1909: Mex I G, 09  
 1912, November 12: Montessus de Ballore, 17  
 Michigan: Hobbs, 11d  
 Mississippi Valley, May 26, 1909: Udden, 10  
 Missouri, Charleston: Purdue, 96  
 April 9, 1917: Finch (R H), 17; Paige, 17  
 Mine explosions and earthquakes: Spalding, 09  
 Mines, effects in: Douglas, 11  
 Morphological relations: Deckert, 02a  
 Movements: Rogers (H D), 43f; induced by earthquakes: Marvin, 07a  
 Nevada, Pleasant Valley: Berry (S L), 16; October 2, 1915: Jones (J C), 15  
 New Brunswick: Kain, 98, 04  
 New England: Dana (J D), 71b; Davis (W M), 86c; Lancaster, 74; Williams (S), 85  
 1638-1869: Brigham (W T), 71  
 1755: Brasch, 16; Prince, 55  
 New Hampshire: Alden (T jr), 04  
 New Madrid earthquake: Bringier, 21; Broadhead, 02; Fuller, 05t, u, 06i, j, 12; Macfarlane, 83; McGee, 93h, 02a; Sampson, 13; Shepard, 05b; Usher, 37  
 New Mexico, Socorro: Bagg, 04a  
 1906 and 1907: Reid (H F), 11b  
 New York, records at Albany: Clarke (J M), 07d, 08, 09, 12; Newland, 06a  
 western, 1857: West, 58  
 1874, December: Martin (D S), 75  
 Nicaragua: Crawford (J), 92b, 02, 02a; Dutton, 91a; Hayes, 99; Jones (J O), 03  
 North America: Barton, 05; Deckert, 02a  
 North Carolina: Alvord, 74; Clingman, 75  
 Bald Mountain, Rutherford Co.: Bradley, 74b  
 August 26, 1916: Finch (R H), 16  
 Northeastern America, 1870: Twining, 71

## Earthquakes—Continued.

- Nova Scotia: Woodman, 06a; Cape Breton: McIntosh, 13  
 Observation of: Wood (H O), 11  
 Ontario, April 28, 1913: Klotz, 13  
 Origin: Böse, 11; Gerland, 99  
 Pacific coast region: Branner, 15; McAdie, 07  
 catalog, 1769-1897: Holden, 98  
 list of recorded earthquakes: Holden, 87  
 Panama: MacDonald (D F), 15a  
 Almirante, April, 1916: Reid (H F), 17  
 Los Santos: MacDonald (D F), 13  
 Quebec: Laflamme, 07  
 Rainfall, relation to: Sayles, 13a  
 Salvador: Dollfus, 68; Goodyear, 80a  
 Seasonal distribution: Montessus de Ballore, 91  
 Seasonal periodicity: Spalding, 15  
 South Carolina, Charleston region: Taber (S), 14  
 1857: Gibbes, 59  
 1907. *See* Charleston *above*.  
 1913, January 1: Taber, 13a  
 1914: Taber, 15  
 Southern Appalachians, Feb. 21, 1916: Humphreys, 16  
 Study methods: Davison (C), 00  
 Sundry earthquakes: Anon, 65a  
 Tennessee, eastern: Gordon (C H), 13b, 14  
 Theory of: *See*, 08a, b  
 Times and places: Turner (H H), 06  
 Trinidad: Anderson (R), 11a  
 United States: Montessus de Ballore, 98; Perrey, 50  
 eastern, January 2, 1885: Rockwood, 85a  
 western: Shaler, 69e  
 1843, January 4: Rogers (H D), 43  
 1870, October: Whittlesey, 71, 72  
 1916: Humphreys (W J), 16a  
 United States and dependencies: Reid (H F), 12  
 Vibrations, direction: Branner, 15a  
 Virginia, Buckingham Co.: Taber (S), 13b  
 Giles Co.: Campbell (M R), 98b  
 1913, April 9: Watson, 18  
 Washington records, 1905: Marvin, 05  
 West Indies, catalog: Poey, 58  
 1811-1813: Mitchill, 15  
 1852, April 29: Blodgett, 53  
 1911, February 18: Klotz, 15  
 1914, February 10: Klotz, 15a  
 1917, January 30: Klotz, 17  
 Earthquake sea waves: Reid (H F), 14a  
 Earthquake sounds: Hayden (E), 86b  
 Earthquake waves, Pacific coast: Bache, 56  
 East Kootenay, B. C.: Schofield, 12, 12a  
 Eastport folio, Me. (no. 192): Bastin, 14  
 Eastport quadrangle, Me., Paleozoic faunas: Williams (H S), 12b  
 East St. Louis district, Ill.: Bowman (I), 07; Fenneman, 07a  
 Eastman, C. R., biography: Dean (B), 18  
 Eaton, Amos, biography: Anon, 90c  
 Ebensburg folio, Pa. (no. 133): Butts, 05b  
 Echini, phylogeny (Jackson): Schuchert, 12  
 Echinodermata. *See also* Asteroidea; Blastoidea; Crinoidea; Cystoidea; Echinoidea; Invertebrata.  
 Cambrian holothurians: Clark (A H), 13a  
 Carboniferous: Carpenter (P H), 91; Miller (S A), 90, 94b



## Echinodermata—Continued.

- Devonian, Wisconsin: Cleland, 11; Maryland: Clarke (J M), 13e  
 General: Miller (S A), 82e  
 Geologic distribution of Mesozoic and Cenozoic: Clark (W B), 09b  
 Guadalupian fauna: Girty, 08  
 Hydrospires: Hudson, 15  
 Illinois, Carboniferous: Worthen, 83c  
 Index fossils: Grabau, 09f  
 Indiana: Miller (S A), 92  
     Carboniferous: Miller (S A), 89b  
     Salem limestone: Beede, 06  
 Inorganic constituents: Clarke (F W), 15a  
 Iowa, Carboniferous: Miller (S A), 89b  
 Kentucky: Miller (S A), 92; Carboniferous: Lyon, 57b  
 Mesozoic: Clarke (W B), 93; and Cenozoic: Clark (W B), 15  
 Mexico, Cerro de Muleros: Böse, 10  
 Mississippian: Hambach, 84a  
 Missouri: Keyes, 94c; Miller (S A), 92; Rowley, 05; Shumard (B F), 55  
     Carboniferous: Miller (S A), 89b, 94b  
     Pike Co.: Rowley, 91c, d  
     Silurian: Rowley, 04  
 Niagaran, Illinois: Miller (S A), 80d, 81d  
 Ohio, Maxville limestone fauna: Morse, 11  
 Ontario, Ottawa: Billings (W R), 81  
     Trenton: Billings (W R), 83; Springer, 11b  
 Ordovician: Raymond (P E), 12b  
 Paleozoic: Miller (S A), 94a, 95; catalog: Shumard (B F), 66a  
 Parapsonema, Portage beds, N. Y.: Clarke (J M), 60b; Fuchs, 05  
 South Carolina: Ravenel, 50  
 Synonymic list, Paleozoic: Lyon, 60a  
 West Indies: Guppy, 79b

Echinoidea. *See also* Echinodermata.

- Alabama, Eocene: Morton, 46a  
 American and European, relations: Gregory (J W), 92b  
 Anguilla: Cotteau, 74  
 Antilles: Lambert (J), 15.  
 Archaeopneustes, Barbados: Gregory (J W), 92  
 Asterostoma, Cuba: Cotteau, 71; Fernández de Castro, 77  
 Buda limestone: Whitney (F L), 16  
 California, Contra Costa Co.: Rémond, 63b  
     Neocene: Merriam, 98  
     San Pablo group: Kew, 15  
     Scutella and Scutaster: Pack, 13  
     Tertiary: Kew, 14, 17; Merriam, 99; Pack, 09; Weaver, 08  
 Cassidulus, Alabama: Gabb, 60h  
 Costa Rica: Jackson (R T), 17, 18  
 Cretaceous: Agassiz (A), 82; Schlüter, 87; revision: Clark (W B), 91a  
 Cuba: Cotteau, 81, 97; Encope: Cortazar, 80  
 Cystechinus, Barbados: Gregory (J W), 89  
 Geologic range and evolution: Kew, 18  
 Georgia, Eocene: Conrad, 50; Tertiary: Bouvé, 51  
 Hemiaster, Cretaceous, British Columbia: Whiteaves, 04c  
 Jamaica, Tertiary: Michelin, 56

## Echinoidea—Continued.

- Macraster, Cretaceous, Texas: Roemer, 88b  
 Melonites: Jackson, 96, 96a; St. Louis, Mo.: Norwood, 46b; Roemer, 55  
 Mexico, Cretaceous: Cotteau, 90; northeastern: Dickerson, 17  
 Mississippi, Ripley group: Slocum, 09  
 Mississippi Valley, Carboniferous: Meek, 60d  
 Mississippian: Meek, 69a  
 New Jersey, Cretaceous: Conrad, 50  
 New York, Devonian: Olsson, 12  
 North Carolina: Conrad, 65b  
 Oligoporus: Jackson (R T), 95  
 Palaeochinoidea: Etheridge, 74; Jackson, 96a; Paleozoic, revision: Klein, 04; synopsis: Keyes, 95q  
 Panama Canal Zone: Jackson (R T), 17, 18  
 Phylogeny of the Echini: Jackson (R T), 12; Schuchert, 12  
 Pygorhynchus: Agassiz (L), 47; Millstone grit. Georgia: Bouvé, 46  
 Ravenella, Florida: McCrady, 59a  
 St. Barthélemy: Cotteau, 74  
 Salaria texana: Credner (G R), 75  
 Scutella, California: Rémond, 63a; South Carolina: Ravenel, 42  
 South Carolina: Conrad, 65b  
 Tertiary Echini: Stefanini, 12  
 West Indies, Tertiary: Cotteau, 75; Guppy, 66b; Michelin, 55  
 Eclogites, California: Holway, 04  
 Economic geology (general). *For regional see under the various States. See also Ore deposits, origin, and the particular products.*  
 Alteration of rocks: Steidtmann, 08  
 Alunite and pyrophyllite, association: Turner, 15  
 Application of geology to mining: Spurr, 02a  
 Applied geology: Brooks, 12; scope: Johnson (D W), 06  
 Bibliography: Hopkins (T C), 97f  
 Black dikes: Lakes, 09c  
 Breccia: Wallace (J P), 00  
 Canadian tellurium-bearing ores: Cairnes, 11b  
 Classification of economic deposits: Crosby, 95a  
     of metalliferous mineral lands: Stone (R W), 12b  
     of ore deposits: Kemp, 92b; Quirke, 17a  
 Colloidal gold and silver: Bastin, 15  
 Common minerals, determination: Moses, 85, 00; Rowe, 10a  
 Common minerals and rocks: George (R D), 17  
 Concentration of ores, natural: Lane, 97  
 Conditions of occurrence of ores: Winchell, (H V), 10  
 Conglomerates, metal-bearing: Storms, 99f  
 Conservation of mineral resources: Kemp, 10f  
 Contact zones: Kemp, 13c  
 Contributions to economic geology: Emmons (S F), 03, 06; Hayes, 08; Lindgren, 13a  
 Cross-fractures and ore shoots: Webber, 12  
 Cross-vein ore shoots: Weed, 03i  
 Definitions of terms: Emmons (S F), 06c  
 Demonstrating ore formations, new method for: Nicholas, 09



## Economic geology—Continued.

- Depth, persistence of ores in: Beadle, 93; Blake (W P), 93d; Blandy, 93; Rickard, 93, 16; Stevenson (R), 93
- Depth and continuity of fissure veins: Lakes, 09d
- Dip and pitch: Raymond (R W), 08
- Economic geology, progress in 1905: Bain, 05g
- Economic geology in the United States: Emmons (S F), 10
- Enrichment, downward sulphide: Allen (E T), 10
- in regions of small erosion: Herrick, 03
- of ore deposits: Emmons (W H), 17
- Evolution of a mineral vein: Lakes, 06a
- Examination of water in surveys: Dole, 11
- Exploration of metalliferous deposits: Emmons (W H), 17a
- Fallacies regarding ore deposits: Williams (A), 99
- Fault breccia veins in the Sierra Madre: Bagg, 06
- Faulting in veins: Church, 92
- Field book of practical mineralogy: Miller (G W), 01
- Field observations of ore deposits: Emmons (S F), 07b
- Field test for magnesia: Catlett, 07a
- Field work, need of, in study of ore deposits: Coleman, 07e
- Filtration through a mineral filter: Sullivan, 08
- Fineness of gold: Knopf, 13c
- Fissure deposits: Attwood, 95
- Fissure veins: Emmons (S F), 06a; Hess, 06b; Kelley, 06; Kemp, 05d; Louis, 06; Raymond (R W), 05; Spencer (A C), 05e, 06; Spurr, 05f, 06
- Fluorine in sericitization: Paige, 18
- Folding of rock strata: Nason, 09
- Garnet zones, formation: Kemp, 06b
- General: Balch, 82; Dickson, 35; Kemp, 18c; McLeod, 14; Miller (G W), 01, 03, 06; Penfield, 03; Schöpf, 87; Smith (F H), 82, 90; Spurr, 04; Stewart (C A), 12a; Storms, 13a; Williams (S G), 86
- Geogenesis, bearing on economic geology: Frazer, 05
- Geologic bases of mining law: De Kalb, 10
- Geologic distribution of useful metals: Emmons (S F), 94a
- Geologic horizons of metals: Hunt, 73; of ore deposits: Lakes, 04f
- Geological diagnosis: Irving, 12
- Geology, relation to oil industry: McDowell, 17
- Geology and economics: Kemp, 11
- Geology and mining, relations: Babb, 10; Hatch, 14
- Geology and ore deposits: Weed, 12d
- Geology applied to mine examination: Joralemon, 12
- Geology applied to mining: Hancock, 10; Moore (C J), 04
- Gneissic galena ore, British Columbia: Uglow, 17
- Gold, associated with pyrite and tellurides: Sharwood, 07; transfer by mineral waters: Emmons (W H), 10c

## Economic geology—Continued.

- Gold and pyrite: Lindgren, 06g; Smyth, 06
- Gold-bearing fissure veins: Lindgren, 97c
- Gypsum and anhydrite: Wallace (R C), 14a
- History of economic geology in the United States: Emmons (S F), 10
- Horses: Wallace (J P), 00
- Hydrothermal alteration of granite: Moore (E S), 12a
- Igneous intrusions: Rickard, 15a
- Indicator veins: Storms, 99i
- Investigation of copper enrichment: Graton, 13
- Iron ore exploration, geology in: Leith, 12
- Iron ores, investigations of: Eckel, 06a, 07
- Laccoliths and ore deposits: Storms, 99j
- Law of the apex: De Kalb, 06a; Robertson, 06
- Literature on ore deposits: Kemp, 88; in 1910: Ransome, 11e
- Lodes, veins, and beds, irregularities: Köhler (G), 87
- Magnetic observations in geological and economic work: Smyth, 07
- Metal mining industry in Western States: Lindgren, 07d
- Metalliferous deposits, origin: Hunt, 73c
- Metalliferous ores, investigation of: Emmons (S F), 06e; Lindgren 08a
- Metalliferous veins: Kemp, 05c, 06
- Metallogenetic epochs: Lindgren, 09c; in pre Cambrian of Ontario: Miller (W G), 15, 15a
- Microscopic examination of opaque minerals of ore bodies: Campbell (W), 06
- Microscopical petrography: Wadsworth, 13
- Microscopy in economic geology: Beck, 13
- Mine examiner and prospector's companion: Miller (G W), 07
- Mineral and metallic veins: Featherstonhaugh, 32c
- Mineral belts, Pacific slope: Becker, 84a
- Mineral deposits: Lindgren, 13
- Mineral fuels: Campbell (M R), 07a, 10
- Mineral veins, formation: Everette, 08a
- Minerals, opaque, microscopical determination: Murdock, 16
- Minerals of New England States: Kempton, 09
- Mines handbook: Weed, 16
- Mining geology, text-book: Miller (G W), 06
- Mining terms, definitions: Merrill (F J H), 09a
- Natural associations of gold: Lincoln, 11
- Nonmetallic mineral products of U. S.: Eckel, 04h
- Nonmetallic minerals: Merrill (G P), 04; classification: Merrill (G P), 01; investigations of: Eckel, 06a
- Ohio Valley: Lawrence, 43
- Ore, definition of: Kemp, 09; Peele, 13
- Ore bodies, outcrop of: Emmons (W H), 09a
- Ore bodies without walls: Merrill (F J H), 08e
- Ore deposition, development of theories of: Emmons (S F), 09
- Ore deposition, theory of: Jaggar, 08a
- Ore deposition and deep mining: Lindgren, 05g
- Ore deposits: Emmons (S F), 13; Wallace (J P), 08; nature: Weed, 05; present tendencies in the study of: Lindgren, 07c; surface appearance and alteration: Bancroft (G J), 11a



## Economic geology—Continued.

- Ore deposits and enclosing walls: Fairbanks, 93c; Lindgren, 93c
- Ore deposits and industrial supremacy: Stewart, (J L), 05
- Ore deposits and the law of the apex: Shamel, 07
- Ore deposits connected with placers: Alderson, 09
- Ore deposits in glaciated regions: Brock, 11b; Emmons (W H), 11a; Moubray, 11; Winchell (H V), 11; Wright (C W), 11
- Ore deposits in limestone, forms: Henrich, 88
- Ore deposits in sandstone: Kennan, 15a
- Ore deposits of the U. S.: Henning, 11
- Ore in schists and slates: Lakes, 04b
- Ore shoots: Boehmer, 08; Garrison, 12; Irving, 08; Jennings, 09a; Lindgren, 09; Ransome, 08c; Rickard, 11; Sales, 08; Sjögren, 08; Smith (F C), 08; Stirling, 08; Weed, 06b; Winchell (H V), 08
- decrease of value with depth: Garrison, 11
- influence of depth: Kemp, 13e
- surface indications: Ransome, 11b; Rodgers, 11; Storms, 10a
- Ores in the Archean of North America: Heneage, 06
- Ores of copper, lead, gold, and silver: Fulton (C H), 16
- Ores of economic importance: Hovey, 02b
- Organic remains in ore deposits: Lakes, 05e
- Oxidation of pyrite: Grout, 08
- Oxidation of sulphides: Gottschalk, 12
- Pegmatite, origin: Hastings, 08a
- Pegmatite veins, formation: Brögger, 94
- Phase rule: Day (A L), 05b
- Placer investigations: Hutchins, 07a, b
- Precious metals, production: King (C), 82
- Precipitation of gold and silver: Palmer (C), 13
- Principles: Emmons (W H), 18
- Protore: Ransome, 13b
- Public interest in mineral resources: Smith (G O), 17a
- Pyrite and marcasite: Wilson (E B), 11a
- Quartz veins in lamphrophyre intrusions McLennan, 15
- Rare metals and minerals: Schaaf-Regelmann, 07; Walsh, 07
- Recent literature on economic geology: Loughlin, 10b; Paige, 13c
- Recording data in regard to ore deposits: Rice (C T), 10
- Recrystallization of limestone: Leith, 14c
- Replacement ore bodies: Irving (J D), 11; Ray, 15a; Stevens (B), 12
- Rôle of mineralizers in ore segregations in basic igneous rocks: Singewald, 17a
- Secondary enrichment: Finlayson, 10; in silver: Bastin, 13a
- Sedi-genetic and igneo-genetic ores: Bain, 06c
- Semi-precious stones, United States: Reed (E A), 05
- Shoots in metalliferous deposits: Irving, 08
- Silicate zones, secondary: Kemp, 14a; Leith, 14c; Lindgren, 14c; Stewart (C A), 14
- Silver ores, microscopic study: Guild, 17
- Solution of gold in surface alterations of ore bodies: Brokaw, 10

## Economic geology—Continued.

- Special problems in economic geology: Ashley, 11g; Bain, 10; Bastin, 11a; Branner, 11; Brock, 11a; Buckley, 11; Chamberlin (T C), 10a; Cornell, 11; Emerson (B K), 11a; Irving, 10; Jaggard, 10a; Lindgren, 10c; Spilsbury, 10; Stevenson, 10; Walcott, 11a
- Specific volume of ore: Mead (W J), 08
- State surveys, work of: Mathews, 11
- Strike of ore bodies: Bond, 11
- Sulphide enrichment: Emmons (S F), 10c; Keyes, 10b; Ransome, 10
- Sulphides, order of origin: Thompson (A P), 13; replacement by quartz: Wolcott, 18
- Surface indications of ore shoots in depth: Storms, 10a
- Syllabus of lectures on economic geology: Branner, 95, 11b
- Teaching of economic geology: Smith (W S T), 12; Tolman, 12a
- Tests for metals in minerals: Fansett, 18
- Textbook: Emmons (W H), 18; Richardson (C H), 13; Ries, 05; Smith (F H), 90; Tarr, 94; Williams (S G), 85
- Titaniferous magnetite, structure: Singewald, 13b
- Transportation and deposition of gold in nature: Lenher, 12
- Types of ore deposits: Bain, 11b
- United States: Dieffenbach, 55; Raymond, 70; Ries, 05, 10a, 14a; Tarr, 94; Whitney, 54; eastern: Schöpf, 87, 88
- United States Geological Survey, relations to mining industry: Smith (G O), 07e
- U. S. National Museum collection: Dewey, 91
- University training of engineers in economic geology: Branner, 06d; Glenn, 06a; Leith, 06a; Merrill (G P), 06d; Reid (J A), 07b
- Useful minerals: Schrader, 17; classification: Wadsworth, 94; of the United States: Sanford, 14
- Vein cavities, origin: Nason, 01b
- Vein formation: Comstock, 92a
- Vein walls: Rickard, 96
- Veinlets in sedimentary rocks, origin: Taber (S), 17b
- Veins, formation: Kemp, 04b
- Walls of mineral veins: Storms, 99h
- War minerals: Spurr, 18
- Water in veins: Rickard, 03d
- Waters, meteoric and magmatic: Kemp, 08b; Turner, 08c
- Weathered pyrite: Eakle, 07a
- Western ore deposits: Blake (W P), 80b; Lakes, 05
- Zenogynous ore deposits, classification: Hastings, 95a
- Zonal growth in hematite: Sosman, 17
- Eczeme as geologic chronometer: Lachmann, 12
- Edaphosaurus: Case (E C), 06a
- Eden Ridge coal field, Oreg.: Leshner, 14
- Edentata: Cope, 89i; ancestry: Matthew (W D), 12c; footprints, Nevada: Marsh, 83b; Orycterotherium, Missouri: Harlan, 43
- Edestus: Eastman, 03; Hitchcock (F R M), 87; Newberry, 88g
- Edgemont folio, S. Dak. (no. 108): Darton, 04a



Edmonton coal field, Alta: Dowling, 10a  
 Edmontosaurus regalis, Edmonton formation: Lambe, 17b  
 Educational. *See also* Textbooks.  
   Apparatus for instruction in structural geology: Hobbs, 08b  
   Applied geology in the technical school: Johnson (D W), 06  
   Columbia University excursions: Shimer, 03, 03a, b  
   Columbia University summer school: Shimer, 02b  
   Cornell summer school: Smith (C E), 02  
   Excursions, manual of: Martin (L), 13  
   Field geology, Ohio State University: Lamb (G F), 05; Mead (C S), 03  
   Field school of geology: Anon, 11d  
   Field work in physiography: Davis (W M), 02c; Low, 05a  
   General: Ives, 87  
   Geologic science, relation to education: Shaler, 96a  
   Geological trips in central Ohio: Prosser (C S), 10a  
   Geology in colleges: Hopkins (T C), 96c; Simonds, 96b; Williams (H S), 93  
   Geology in education: Salisbury, 18b  
   Geology in our preparatory schools: Taylor (W E), 88  
   Geology in the high school: Alderson, 89  
   Harvard summer school: Shaler, 76c  
   Instruction in geological investigation: Davis, (W M), 87  
   Interpretation of topographic maps: Salisbury, 13  
   Laboratories for physical geography: Wright (C T), 09  
   Laboratory and field work: Tarr, 97c, 02a  
   Laboratory exercises in structural and historical geology: Salisbury, 13a  
   Laboratory for physiography: Stearns, 09  
   Laboratory for topographic work: Mead (W J), 09  
   Laboratory manual in physical geography: Hopkins, 09  
   Lecture notes: Fontaine, 98  
   Lectures on geology, synopsis: Rogers (H D), 35a; Silliman, 29  
   Methods of instruction: Crosby, 88b; Williams (H S), 87a  
   Mineralogy, methods of instruction: Wadsworth, 84d  
   Minerals and rocks, Crosby, 81  
   Mnemonic couplet: Todd (J E), 15  
   Modelling of physiographic forms in laboratory: Hobbs, 10c  
   Optical mineralogy, teaching of: McNair, 11  
   Paleontology, relation to schools and colleges: Clarke (J M), 99e  
   Physical geography, laboratory manual: Brigham, 05  
   Physical geography exercises: Davis (W M), 10c  
   Physical geography in the secondary school: Fairbanks, 09; Fenneman, 09a  
   Physical geography in the university: Davis (W M), 94a; Marbut, 05  
   Physical geography teaching: Davis (W M), 93

## Educational—Continued.

  Physiographic study in the laboratory: Von Engeln, 11b  
   Physiography: Davis, 89, 96d, 97; in the university: Marbut, 05  
   Practical exercises in physiography: Davis (W M), 03d  
   Preparation of a report: Van Ingen, 16  
   Representation of land forms in the physiography laboratory: Tarr (R S), 08a  
   Rocks, lecture notes on: Kemp, 95a  
   Scope of geological teaching: Rice (W N), 04a  
   Story of our continent: Shaler, 92  
   Studies in geology: Salisbury, 13b  
   Study of common minerals: Hopping, 00  
   Study of minerals and rocks: Holt, 13  
   Syllabus of lectures: Winchell (A), 70a, 75, 79; on economic geology: Branner, 11b; on field geology: Keyes, 16; on geologic processes: Keyes, 14a; on geology: Cope, 90  
   Teaching economic geology: Smith (W S T), 12; Tolman, 12a; to mining engineers: Stewart (C A), 11a  
   Teaching elementary crystallography: Pogue, 18a  
   Teaching of geology: Winchell (A), 89  
   University training of engineers in economic geology: Branner, 05, 06d; Glenn, 06a; Irving, 05c; Leith, 06a; Merrill (G P), 06d; Reid (J A), 07b  
   Wet laboratory in physiography teaching: Von Engeln, 08  
 Egg, fossil, Arizona: Morgan, 04, 04a; Nebraska Oligocene: Troxell, 16a  
 Egleston, Thomas, biography: Kunz, 02; Martin (D S), 99a; Moses, 00a, b  
 Eights, James, biography: Clarke (J M), 16b  
 Elasmosaurus: Cope, 70c; Williston, 06a  
 Elaterite, eastern Utah: Maguire, 00b; Weston, 04  
 Elbert formation, Devonian: Cross, 04a  
 Elders Ridge folio, Pa. (no. 123): Stone (R W), 05a  
 Eldridge, G. H., biography: Cross, 07b; Emmons (S F), 06e  
 Electric activity in ore deposits: Wells, 14  
 Electric coal field, Park Co., Mont.: Calvert, 12b  
 Elephant. *See* Mammalia.  
 Elevation and subsidence. *See* Changes of level.  
 Elizabeth Islands, Mass.: Hollick, 01  
 Elizabethtown quadrangle, N. Y.: Kemp, 10c  
 Elk City district, Idaho: Flagg, 13  
 Elk Mountain mining district, Elko Co., Nev.: Schrader, 12  
 Elk Point folio, S. Dak.—Nebr.—Iowa (no. 156): Todd (J E), 08  
 Elk River coal basin, B. C.: Dowling, 06  
 Elkhorn coal field, Ky.: Stone (R W), 07  
 Elkhorn district, Jefferson Co., Mont.: Weed, 01  
 Elkhorn Mountains, Mont.: Stone (R W), 11  
 Elkland-Tioga folio, Pa. (no. 93): Fuller, 03a  
 Ellamar district, Alaska: Capps, 13a 15a  
 Ellensburg folio, Wash. (no. 86): Smith (G O), 03  
 Ellijay folio, Ga.—N. C.—Tenn. (no. 187): La Forge, 13  
 Ellipsoidal lavas, Glacier National Park, Mont.: Burling, 16a; Prince William Sound, Alaska: Capps, 15d  
 Ells, R. W., biography: Bishop (W L), 12



- Elmira quadrangle, N. Y.: Clarke (J M), 05b  
 Elmore folio, Colo. (no. 58): Hills, 99  
 Elotherium, osteology: Scott, 98; restoration: Marsh 94a  
 El Paso folio, Tex. (no. 166): Richardson (G B), 09  
 El Paso Range, Cal.: Baker (C L), 12  
 Ely district, Nev.: Spencer (A C), 17; Weed, 12c  
 Ely iron ore deposits, Minn.: Abbott, 07  
 Emanations, classification: Stevens (B), 12a; physical data; Stevens (B), 12b  
 Emerald.  
   Maine: Bastin, 11  
   North Carolina: Hidden, 82a; Sterrett, 12  
   United States: Bruce, 14d  
 Emery.  
   General: Fuller (H T), 04  
   New York: Rogers (G S), 11a; Westchester Co.: Eckel, 01b  
   Virginia: Watson, 07e, 18e  
 Emmons, E., biography: Marcou (J), 85a, 91a; Perry, 69a; Anon, 96  
 Emmons, S. F., biography: Bain, 11; Becker (G F), 11, 13; Cross, 11b; Hague, 12a; Pirsson, 11b; Ransome, 11a; Anon, 11, 11a  
 Empedocles, skull: Cope, 80h  
 Engelmann, George, biography: White (C A), 02  
 Enrichment of ore deposits: Emmons (W H), 17  
   *See also* Ore deposits, origin.  
 Enchodus, teleostean: Green, 13  
 Encrinurus: Vogdes, 07a  
 Engineer Mountain folio, Colo. (no. 171): Cross, 10  
 Engle coal field, N. M.: Lee (W T), 06b  
 Enlargement of minerals: Irving, 84  
 Enstatite and clinoenstatite: Wright (F E), 09  
 Entelodontidae, revision: Peterson, 09  
 Entomolestes: Gregory (W K), 13b  
 Eobasileus: Cope, 73zl, zm  
 Eocene. *See* Tertiary.  
 Eoceratops: Lambe, 15  
 Eodevonaria: Breger, 06  
 Eohippus from Wyoming: Granger, 11  
 Eolation. *See* Wind work.  
 Eolian action. *See* Wind work.  
 Eolian deposits, arid region of West: Russell, 89b  
 Eolian erosion, base level of: Keyes, 09e; locus and character: Hobbs, 15a  
 Eomoropus: Osborn, 13a  
 Eotitanops: Osborn, 13b; restoration: Osborn, 14b  
 Eozoic rocks: Hunt, 78a  
 Eozoon: Archiac, 65; Barker, 74; Bonney, 95, 96; Burbank, 72; Carpenter (W B), 65, 65a, b, c, 66, 67, 74, 74a, b, 75, 76; Carter (H J), 74, 75; Clark (W B), 93b; Dana (J D), 65a; Dawson (J W), 65b, 67a, 68, 71d, 72, 74c, 75, 76b, d, e, f, 77b, 79, 79e, g, 84a, 88b, c, 95c, d, 97; Edwards (A M), 70b; Gratacap, 87; Gregory (J W), 91; Guppy, 67a; Hahn, 76; Hauer, 85; Hunt, 65c, 71c, h; Hyatt, 67a; Jones (T R), 65; Julien, 84a; King (W), 66, 69, 70, 71, 74, 74a, 76, 81; Kirkpatrick (R), 12, 12a, b; Logan, 64a, 65, 67a; Merrill (G P), 89c; Möbius, 78, 79; Moore (C), 80; Perry, 72; Ramsay, 65; Rothpletz, 15; Schultze, 74; Se. wyn, 88b; Stansfield, 12, 13; Vennor, 77; Vilanova y Piera, 74; Massachusetts: Bicknell, 69; Burbank, 71, 72; Perry, 71d, 72; mineral nature: Hunt, 65e; New Brunswick, St. John: Matthew (G F), 90b  
 Eparchean interval: Lawson, 02a  
 Epeirogenic movements: Upham, 02; wave-like progress: Upham, 94a  
 Epicene profiles in desert lands: Keyes, 17d  
 Epigene profiles of the desert: Lawson, 15  
 Epsomite.  
   British Columbia: Jenkins, 18b  
   Washington: Jenkins, 18b  
   Wyoming: Knight (W C), 03b  
 Epsomites: Marsh, 68b  
 Equiplanation in Yukon and Alaska: Cairnes, 12d  
 Equus. *See* Mammalia.  
 Equus beds, Kansas: Haworth, 97b  
 Erosion. *See also* Glacial erosion; Sedimentation.  
   Abrasion by glaciers, rivers, and waves: Westgate, 07  
   Appalachian region: Glenn, 11  
   Arctic latitudes: Tarr, 97e  
   Arctic sea ice: Tarr, 97j  
   Arid deflation, measurement: Keyes, 10k  
   Arid regions: Keyes, 12g; Tarr, 90f  
   Arizona, southern bolson region: Tolman, 09b  
   Arkansas River: Branner, 93  
   Arroyos, formation: Dodge (R E), 10  
   Atlantic coast: Carter (O C S), 99; barrier beaches: Merrill (F J H), 90b  
   Baselevel erosion: Campbell (M R), 97a  
   Baseleveling and river spacing: Shaler, 99d  
   Bermudas: Verrill, 00, 07  
   California: Gilbert, 17; southern: Wright (F B), 00  
   California fault line: Holway, 14b  
   Canyon bottoms, Colorado: Duce, 18  
   Canyons, character and origin: Bross, 81  
   Cataracts, recession: Featherstonhaugh, 45  
   Chesapeake Bay, mouth of Choptank River: Hunter, 14b  
   Climate and terrestrial deposits: Barrell, 08  
   Coast: Dodge, 94a  
   Coast changes, New Jersey: Haupt, 07  
   Coastice, Chaleur Bay: Chalmers, 83  
   Colorado: Endlich, 78c  
     eastern: Hayden, 75  
     headwaters of Rio Grande: Patton, 98a  
     Mesa Verde: Haas, 17a  
     San Juan Mountains: Hopkins, 10b  
     southern: Stevenson, 75  
   Colorado Canyon: Davis (W M), 06c  
   Colorado Plateau region: Gilbert, 75, 76a  
   Concentration versus transportation: Shattuck, 09  
   Continental denudation: Shaw (E W), 15c  
   Convexity of hilltops: Gilbert, 09b  
   Cordilleran region: Powell, 76  
   Cross cutting and retrograding of stream beds: Dellenbaugh, 12  
   Cycle of erosion: Davis (W M), 13b  
   Del Mar pyramids, Cal.: Holder, 01a  
   Denudation in the United States: Dole, 09  
   Desert regions: Lawson, 15  
   Desert weathering: Hobbs, 18a  
   Deserts, stream erosion in: Keyes, 14j  
   Detrital slopes on mountains of the Southwest: Blake (W P), 07  
   Differential erosion: Smith (W S T), 99; and equiplanation: Cairnes, 12d  
   Ducktown, Tenn.: Glenn, 06b



## Erosion—Continued.

- Earth's rotation and stream erosion: Eakin, 10, 15f
- Erosional processes under arid conditions: Keyes, 10g
- Erosion channels, Paleozoic: Ulrich, 09b
- Experiments: Howe, 01; Jaggar, 08
- General: Andrews (E B), 76; Dana (J D), 76e; Davis (R O E), 15; Dutton, 82a; Ehrenfeld, 16; Gordon, (C H), 04b; Hitchcock (E), 51a; Lane, 03e; McGee, 92c; Penck, 05; Powell, 75a; Redfield, 49; Rogers, (H D), 58e; Scott (W B), 01a; Tyrrell, 12a
- Georgia, Milledgeville, ravine: Linton, 98
- Glacial erosion: Davis (W M), 12b; in Alaska: Tarr (R S), 07e; in America: Carney, 09a
- Glacial period in nonglaciaded regions: Huntington, 07
- Gorges of Finger Lake region, New York: Tarr (R S), 06b
- Gouges, erescentic, formed by glacial action: Gilbert, 06
- Grand Canyon of the Colorado: Darton, 17b; Davis (W M), 01; Dutton, 81, 82, 82a
- Gravels, formation and distribution: Gregory (H E), 15a
- Great Basin ranges, erosional origin: Keyes, 09b
- Great Basin region: Keyes, 10f
- Great Lakes, coast erosion: Schoolcraft, 42
- Great plains: Upham, 04b
- Gulf of California: McGee, 00a
- Hawaii: Mann, 66a
- Hillside wash: Purdue, 14a
- Honeycombed limestones in Lake Huron: Bell (R), 95a
- Ice: Culver, 95; eroding power: Newberry, 83h, 85
- Illinois, northwestern: Carman, 09
- Indiana, Clifty and Butler ravines, Jefferson Co.: Culbertson, 12
- Crawfordsville: Hovey (H C), 93
- Jug Rock: Dryer, 99
- Normal Brook: Dryer, 11a
- north and south slopes: Culbertson, 00
- Richmond: Moore (J), 93b
- southern: Culbertson, 98
- Iowa, eastern: Carman, 09
- Karst region of Jamaica: Daneš, 06
- Lake shore: Andrews (E), 70
- Lateral erosion, at Niagara: Wright (G F), 02; on some Michigan rivers: Jefferson, 07
- Limestone solution on bottom of Lake Ontario: Kindle, 15c, Martinique: Hovey, 04e
- Massachusetts, Cape Cod beach: Julien, 02
- destruction of drumlins: Curtis, 10
- Nantucket, shorelines: Gulliver, 09; Wauwinet-Coscata tombolo: Gulliver, 10a
- Winthrop shore lines; Roorbaek, 10
- Meandering, factors controlling: Griggs, 06
- Michigan, Lake shore: Gregory (W M), 05; Hobbs, 11c
- Sanilac Co., wave cutting: Gordon (C H), 02a
- Seul Choix Point Peninsula: Ehlers, 18
- Mississippi, waste lands: Lowe, 10
- Mississippi River: Bowman, 04a; Brown (R M), 02

## Erosion—Continued.

- Missouri, southeastern: Dake, 14
- Missouri River: Duncanson, 09; Ward (L F), 84b, 92b
- Montana and Wisconsin: Mansfield, 08a
- Moulin work under glaciers: Gilbert, 06a
- Natural bridges, origin: Cleland, 10; of Utah: Cummings, 10
- Natural monuments: Holder, 04a
- Naval erosion: Tower, 96
- New Hampshire, trap rocks: Hubbard (O P), 50
- New Jersey, coast: Johnson (D W), 14, 15a; Merrill (F J H), 85
- New Mexico, Rio Mora: Keyes, 10m; southwestern: Rich, 11a
- New York, Staten Island: Hollick, 10; Long Island: Buffet, 03
- Niagara Falls: Bakewell, 57; Gilbert, 07; Hall, (W C), 07; Marcou, 65; Spenceer (J W), 06, 07, 07a, 10, 10g
- Niagara Gorge: Spencer (J W), 12
- Nova Scotia: Bailey, 96b; Sable Island: MacDonald (S O), 83
- Ohio: Andrews (E B), 76
- Fayette Co.: Napper, 14
- Plum Creek: Wright (G F), 12a
- Ontario, Don Valley: Harvey (A), 89
- Ontario shore line, age and origin: Spencer (J W), 17
- Oregon, southern, inter-stream: Hershey, 00d
- Organic: Scovell, 96
- Pacific coast: Carter (O C S), 99
- Peneplanation: Smith (W S T), 99; by wind: Keyes, 12a
- Pennsylvania, Center Co.: Ewing, 85; Susquehanna River: Mathews, 17
- Physiographic processes: Fenneman, 09
- Plateau plains: Keyes, 12g
- Post-Columbia and post-Lafayette erosion: McGee, 93g
- Postglacial: Wright (G F), 12a
- Potholes: Elston, 17
- Rock-cut surfaces in desert ranges: Paige, 12b
- Rate of chemical erosion: Ewing, 85
- Ravines in prairies, origin: Sawyer, 75
- Rocks, characteristics affecting erosion: Todd, 07a
- Saint Vincent: Hovey, 04c; Wallibu and Rabaka gorges: Hovey, 09e
- Sand erosion: Gilbert, 75e
- Sandstone pinnacles: Darton, 12a
- Scaurs on the River Rouge: Jefferson, 04
- Sculpture of mountains by glaciers: Davis (W M), 06d
- Sea caves at La Jolla: Winsted, 13
- Sea cliff erosion, rate: Berkey, 10
- Sheetflood erosion: Keyes, 08a; McGee, 97
- Shore erosion: Collie, 01; Hobbs, 11a
- Shore topography near Davenport, Cal.: Wilson (M E), 07
- Sierra Nevada: Muir, 74; glacial denudation: Muir, 74c; postglacial denudation: Muir, 74d
- Soil erosion: McGee, 11; Shaler, 96c
- Solifluction: Andersson, 06
- South Dakota, Harney Peak district: Hovey, 00f



## Erosion—Continued.

- Stream trenching in semiarid New Mexico: Rich, 11a  
Stream valleys: Rich, 14a  
Tennessee, central basin: Kennedy, 89; western: Purdue, 13b  
Tertiary and Quaternary stream erosion: Upham, 93m  
Tidal erosion: Shaler, 75e; Bay of Fundy: Matthew (G F), 80  
Tide pools, Vancouver Island, B. C.: Henkel, 06  
Transportation of detritus, experiments on: Gilbert, 08a, b  
Unconcentrated wash, erosion by: Fenneman, 08  
Utah, Henry Mountains: Gilbert, 77  
Valley erosion of Big Creek, Ind.: Culbertson, 08  
Valleys, formation: Hovey, 09; incised meandering: Davis (W M), 06  
Weathering and erosion as time measures: Leverett, 09  
Wind erosion in the plateau country: Cross, 08a  
Wyoming, southwestern: Rich, 10  
Yukon: Tyrrell, 10b  
Erratic boulders, Carboniferous, Oklahoma: Taff, 05e, 09b  
Eruptive rocks. *See* Igneous and volcanic rocks.  
Eryops: Cope, 88e; restoration: Matthew (W D), 11c  
Eryops megacephalus: Broili, 99  
Eschelon Mountain, B. C.: Evans (H F), 06b  
Esker fans, structure: Jaggar, 12  
Eskers.  
Alaska, Yakutat Bay region: Tarr (R S), 08  
Birds Hill, near Winnipeg, Manit.: Upham, 10  
Derivation from englacial drift: Upham, 94b  
Formation: Trowbridge, 12, 14b  
General: Reagan, 08a  
Illinois, northern: Hershey, 97  
Indiana, Tippecanoe Co.: McBeth, 05  
Maine: Stone (G H), 81a  
Massachusetts, fault in an esker: Lahee, 08b  
Michigan, Mason: Wooster, 11  
New England, southern: Woodworth, 94c  
New Hampshire: Upham, 77a  
New Jersey: Culver, 94a  
New York, Rochester district: Giles, 18a; Upham, 93i  
Watkins Glen-Catatonk district: Williams (H S), 09  
western: Comstock (F M), 03  
Ohio, Columbus: Morse, 07  
Locust Grove: Thompson (J D), 14  
south of Dayton: Scheffel, 08  
Origin: Crosby, 02; Giles, 18a; Millis, 14; Upham, 77a  
Subglacial origin: Davis (W M), 92b  
Superglacial, Illinois: Upham, 94n  
Esmeralda formation: Turner, 00, 00d; plants: Knowlton, 00e  
Essays. *See* Addresses.  
Essex limestone, Ill.: Savage, 12  
Estancia Plains, N. Mex.: Keyes, 08b  
Estancia Valley, N. Mex.: Meinzer, 11  
Estillville folio, Va.-Ky.-Tenn. (no. 12): Campbell (M R), 94  
Etchegoin Pliocene, middle Cal.: Nomland, 17a

- Etchiminian: Matthew (G F), 99e, g, 00c  
Ethics of petroleum geologist: Clapp (F G), 17a  
Euclastes: Cope, 67a  
Eucrotaphus: Leidy, 50  
Euoplocephalus n. n.: Lambe, 10b  
Eureka district, Nev.: Chance, 08; Curtis, 84; Hague, 92  
Eureka shale, northern Ark.: Hopkins (T C), 92  
Eureka Springs-Harrison folio, Ark. (no. 202): Purdue, 16  
Eurypterida.  
Carcinosoma newlini: Claypole, 90c  
Distribution and occurrence: O'Connell, 13  
Echinognathus: Walcott, 82  
Eurypterus: Dekay, 27  
Indiana: Miller (S A), 96b  
Nebraska: Barbour, 12, 14b  
New York: Dekay, 25; Harlan, 34; Roemer, 48d  
Buffalo: Pohlman, 85; Roemer, 78.  
Oneida Co., N. Y.: Mitchill, 18a  
Eurysoma: Claypole, 90b  
General: Barbour, 14b; Clarke (J M), 09, 10, 12, 12c; Hall, 85g; O'Connell, 17  
Habitat: O'Connell, 16; Ruedemann, 16  
Missouri, St. Francois Co.: Beecher, 01b  
Mode of life: Clarke (J M), 10d  
Nebraska, Carboniferous: Barbour, 12, 14i  
Pennsylvania: Hall, 84h; Hall (C E), 77; Darlington shales: Mansfield, 81  
Pterygotus, Hamilton, Ont.: Dawson (J W), 79d  
Stylonurus, New York: Hall, 85g; restoration: Beecher, 00a  
Virginia, Lyons Gap: Shuler, 15  
Eurypterus fauna of Shawangunk grit: Clarke (J M), 07c, e  
Eurypterus shales, Shawangunk Mountains: Clarke (J M), 07c  
Evans, John, biography: Shumard (B F), 63e  
Evanston-Waukegan region, Ill.: Atwood, 08a  
Everglades, southern Florida: Sanford, 09  
Evergreen copper deposit, Colo.: Ritter, 08  
Evesthes jordani, primitive flounder from Miocene of California: Gilbert (J Z), 10a  
Evolution.  
Acquired characters, transmission: Osborn, 89  
Air-breathing Vertebrata, origin: Barrell, 16a  
Arietidae: Hyatt, 74  
Arthropoda, habitat and origin: Schuchert, 16d  
Baseleveling and organic evolution: Woodworth, 94  
Biologic evolution: Ward (L F), 90b  
Brachiopoda, ontogeny and phylogeny: Beecher, 93  
Cephalopoda: Smith (J P), 14a  
Convergent evolution: Gregory (W K), 14a  
Development of first trilobites: Matthew (G F), 89d  
Diplarthra, metapodial keels: Wortman, 93b  
Drama: Cockerell, 16d  
Elephant: Lull, 08  
Equus: Osborn, 04q, 05f  
Genera, origin: Cope, 68k



## Evolution—Continued.

- General: Agassiz (A), 80; Agassiz (L), 50e; Barbour (T), 16; Beecher, 01; Cockerell, 16d; Cope, 83zg, 87, 96; Dawson (J W), 71f; Gaudry, 92a; Le Conte, 77; Lull, 18a; Mather, 18b; Matthew (W D), 13, 15b; Montgomery (T H), 01; Mudge, 79c, 80; Nicholson, 75l; Osborn, 07c, 14d, 16b, 17; Packard (A S), 98; Schuchert, 18; Scott (W B), 17; White (C A), 03; Winchell (A), 74
- Genetics versus paleontology: Gregory (W K), 17a
- Geological evidence: Callaway, 76; Heilprin, 88
- Growth and decline stages: Hyatt, 88
- Limbs, origin from fins: Gregory (W K), 11, 12d, e
- Lost characteristics: Hyatt, 96
- Mammalia: Cope, 83zg
- Molar evolution: Osborn, 88d
- Mutation theory: White (C A), 02b, 03
- Oecological features: Case, 05b
- Ontogeny and phylogeny: Hyatt, 97
- Organic evolution: Lull, 17
- Origin of certain unit characters: Osborn, 12b, 15a
- Paleontologist's view: Osborn, 12
- Paleontology of arrested evolution: Ruedemann, 18
- Phylogenesis, relation to historical geology: White (C A), 05a
- Phylogeny of an acquired characteristic: Hyatt, 93b, 94
- Polar climate: Wieland, 03a
- Primates: Gregory (W K), 16a
- Recapitulation theory and paleontology: Cummings, 10
- Rôle of service: Shimer, 16b
- Skeleton: Morris (C), 85a
- Spines, origin and significance: Beecher, 98
- Tetraplasy: Osborn, 12f
- Tetrapoda, origin: Gregory (W K), 15
- Time ratios: Matthew (W D), 14a
- Transmission of acquired characters: Osborn, 90
- Vegetable kingdom: Ward (L F), 85b
- Vertebrae, evolution: Williston, 18
- Vertebrata: Cope, 85j; Williston, 12
- Evolution of the earth: Chamberlin (T C), 16a
- Evolutional geology: Sollas, 00
- Excavation deformations: MacDonald (D F), 13e
- Excursions.
- American Association of State Geologists, field trip in Oklahoma: Hotchkiss, 17a
- Association of American State Geologists, field meetings: Cleland, 16b
- Colorado: Van Hise, 01d; northwestern, 1909: Henderson (J), 10
- Columbia, 1905: Brown (T C), 06
- Intercollegiate, New England, 1905: Johnson (D W), 06a
- tenth: Cleland, 10a; thirteenth: Cleland, 15; fourteenth: Barrell, 16b
- Intercollegiate, 1911: Hubbard (E), 11
- International Geological Congress: Moore (E S), 14d; excursions in Mexico: Hovey, 06e
- Massachusetts, Williams College, vicinity: Cleland, 16a

## Excursions—Continued.

- Morrill geological excursion: Barbour, 06b, 97c
- New England: Brown (R M), 09; Cleland, 12, 12a
- New Mexico, Arizona, and Utah: Johnson (D W), 06b
- Pittsburgh region: Grant (U S), 03a
- Rocky Mountain excursion: Emmons (S F), 93
- Transcontinental excursion, 1912: Am Geog Soc, 15
- Exfoliation, concave: Matthes, 14c
- Exfoliation domes: Miller (W J), 11a
- Expeditions and explorations.
- Colorado River: Ives, 58
- Columbia River: Allen (P), 14; Thwaites, 04
- Great Basin: Simpson (J H), 76
- Great Plains: Abert (J W), 46
- John Day region, Oreg.: McClung, 06
- Lewis and Clark: Allen (P), 14; Lewis (M), 06; Thwaites, 04
- Long, Pittsburgh to Rocky Mountains: James (E), 23
- Long, St. Peter's River, Lake of the Woods: Keating, 24
- Mexico, northern: Wislizenus, 48
- Mississippi Valley: Nicollet, 43
- Missouri River: Allen (P), 14; Thwaites, 04
- Nebraska: Warren (G K), 59
- Northwest [Upper Mississippi Valley]: Allen (J), 34; Schoolcraft, 21, 34, 55
- Pacific railroad surveys: Beckwith, 55, 55a; Evans (J), 54; Humphreys, 57; Parke, 55; Pope, 55; Whipple, 55, 56; Williamson, 55
- Red River: Lewis (M), 06
- Red River of Louisiana: Shumard (G G), 53
- Southwest: Abert (J W), 46; Emory, 48; Marcy, 50; Wislizenus, 48
- Stansbury's: Stansbury, 52
- Union Pacific Railway line: Le Conte (J L), 68a
- Wyoming fossil fields, 1899: Knight (W C), 00c
- Yellowstone and Missouri rivers: Hayden, 69a
- Experimental investigations.
- Abstraction of potassium during sedimentation: Watson (J W), 13
- Aggradation and degradation of valleys: Moody (A E), 07
- Appalachian structure, mechanics of: Willis, 93b
- Artificial lava flow and its spherulitic crystallization: Pirsson, 10b
- Continental deformation: Chamberlin (R T), 18b
- Copper sulphide enrichment, reaction: Zies, 16
- Crystalline rocks, formation: Daubrée, 59
- Crystals, growth of: Taber (S), 16c
- Deformation of rocks and minerals: Adams (F D), 10a, 17
- Diabase, flow of: Adams (F D), 10
- Diffusion of crude petroleum through fuller's earth: Gilpin (J E), 11
- Experiment in geology: Adams (F D), 18
- Failure of cavities in crystals and rocks under pressure: Bridgman, 18
- Flow of marble: Adams (F D), 02, 10e
- Flow of rocks: Adams (F D), 97b, 01a, 05a, 11a, 12



## Experimental investigations—Continued.

- General: Adams (F D), 18; Paulcke, 14; Wright (F E), 13g  
 Geyser action: Andrews (E), 74; Davison (J M), 10  
 Gold, transfer by mineral waters: Emmons (W H), 10c  
 Hydrothermal alteration: Stephenson (E A), 16  
 Ice, properties: Tarr (R S), 12d, 15  
 Ice motion: Case, 95  
 Intrusion and erosion: Howe, 01  
 Intrusions, effect: Garfias, 12  
 Joint planes: Sheldon (P), 12  
 Low-angle faulting: Chamberlin (R T), 18  
 Mineral relations from laboratory view point: Day (A L), 10  
 Rain drop impressions: Wyman, 55b  
 Salt solutions: Kindle, 18a  
 Schistosity and cleavage: Becker, 04  
 Secondary enrichment, mercury deposits: Broderick, 16  
 Subglacial debris, upward movement: Guthrie, 92  
 Sulphide ore enrichment, laboratory studies: Young (S W), 16  
 Vadose synthesis of pyrite: Whitman, 13  
 Vein formation: Comstock, 92a  
 Explosion canals in lava, Mexico: Waitz, 11; Wittich (E), 10h  
 Explosion craters: Darton, 16b  
 Exposed Treasure lode, Cal.: De Kalb, 07  
 Extinct lakes. *See* Lakes, extinct.  
 Faceted form of a collapsing geoid: Keyes, 18g  
 Faceted pebbles, Cape Cod, Mass.: Davis (W M), 94b  
 Fairbanks quadrangle, Alaska: Prindle, 08, 13  
 Fairbanks region, Alaska: Prindle, 09a, 13b  
 Fairmont coalfield, W. Va.: Parsons (F W), 06b  
 Fairview district, Nev.: Rice (C T), 06d; Zalinski, 07a  
 Fall line, Atlantic Coastal Plain: Abbe, 03; Cope, 68e  
 Falls. *See also* Niagara Falls.  
   Minnesota, Saint Anthony Falls: Sardeson, 08; Winchell (N H), 88a  
   Mississippi River: Keyes (J A), 87  
   Falls of the Ohio. *See* Kentucky.  
 Fanglomerate: Lawson, 12c, 13  
 Faulting.  
   Age, relative, of intersecting fault systems: Henrich, 89b  
   Alabama, northeastern: Hayes, 92  
   Alaska, Nizina River: Capps, 15g  
   Solomon and Casadepaga quadrangles: Smith (P S), 10  
   Yakutat Bay: Tarr (R S), 12b  
   Appalachians: Willis, 93a; overthrust faults: Hayes, 91  
   Arizona, Grand Canyon district: Johnson (D W), 09; Powell, 73a; Ransome, 08b; Walcott, 90a; northern: Darton, 10a  
   Arkansas: Ashley, 97  
   Eureka Springs-Harrison quadrangles: Purdue, 16  
   northern: Branner, 00  
   Atlantic Coastal Plain: Hollick, 94f  
   Block faulting and ore genesis: Jenney, 06b

## Faulting—Continued.

- British Columbia, Hedley district: Camsell, 10a  
 California: Arnold, 07i; Crandall (R), 07a; Lawson, 08; Montessus de Ballore, 09; Reid (H F), 08a  
 Coast Ranges: Osmont, 05  
 Klamath region: Hershey, 06  
 Mohawk Valley: Turner, 91a  
 Owens Valley: Hobbs, 10f; Johnson (W D), 10  
 San Jacinto region: Arnold, 18  
 Santa Cruz fault line: Ashley, 06d; Branner, 06b, c; Carey, 06; Gilbert, 06d  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Cruz Range: Newsom, 08  
 Sierra Nevada: Becker, 91; Lindgren, 11; Reid (J A), 06; Reyer, 86  
 Taylorsville region: Diller, 08  
 Canada, St. Lawrence Valley: Kindle, 15  
 Cap-au-Grès fault: Keyes, 17j  
 Carboniferous, Pennsylvania: Wasmuth, 88a  
 Cause: Church, 93; Dutton, 89a; Hixon, 11  
 Classification of faults and fractures: Fohs, 06  
 Clay slips, origin: Wilson (W B), 16  
 Colorado, Aspen district: Henrich, 89b; Spurr, 09a  
   Denver region: Eldridge, 90  
   Front Range: Richardson (G B), 12a  
   Georgetown quadrangle: Spurr, 08  
   Golden: Patton, 04, 05  
   Leadville: Emmons (S F), 82; Yankee Hill deposit: Shedd, 81  
   Monarch district: Crawford (R D), 10, 13  
   northern: Ziegler, 17b; foothills structure: Ziegler, 17c  
   Ute Pass: Crosby, 97c  
 Connecticut: Hobbs, 03d  
   Meriden, Triassic: Davis (W M), 89a  
   Pomeraug Valley: Hobbs, 00b, 01  
   Triassic area: Davis (W M), 94, 98; Rice (W N), 06a  
   western: Hobbs, 04a  
 Crustal adjustment, upper Mississippi Valley: Keyes, 94e  
 Differential faults: Hobbs, 94a  
 Displacement, mutual, by intersecting veins: Weed, 07a  
 Earth movements associated with San Francisco earthquake: Oldham, 09  
 Eastern United States, seismic: Hobbs, 07a  
 Fault rules: Freeland, 93  
 Faultfinder: Simons, 14a; Weeks (W S), 14  
 Faulting, experimental demonstration: Reid (H F), 09b  
 Faulting in veins: Church, 92; Emmons, 92b; Emmons (S F), 92; Gresley, 92a; Ricketts, 92; Wilson (E B), 92  
 Fissures, laws of: Stevens (B), 09; Telluride district: Purington, 05b  
 Folded faults, southern Appalachians: Keith, 02a, 04b  
 Fracture, law of: Owen (R), 83a  
 Fracture systems, correlation: Hobbs, 05, 05b  
 General: Becker (G F), 85b; Browne (R E), 84; Church, 92; Emmons (S F), 92; Hobbs, 11b; Lakes, 05i; Le Conte, 89a; Leith, 13; Martin (D S), 89; Reid (H F), 12g; Ricketts, 92; Rogers (H D), 58d; Storms, 11a; Van Hise, 96; Williams (A), 93



## Faulting—Continued.

Geometry of faults: Reid (H F), 09a, 10b  
 Glacial gravel and sand: Henrich, 97  
 Graphic solution of fault problems: Tolman, 11  
 Graphics applied to fault problems: Rice (E R), 13  
 Great Basin region: Gilbert, 83b; Keyes, 09k, 10f; Louderback, 15a; Russell, 87; Spurr, 01a  
 Hades, determination: Willis, 92a  
 Harper's Ferry: Walling, 84  
 Hawaiian Islands: Powers, 17  
 Heave-fault slipping, cause: Wood (H O), 15a  
 Housatonic fault, Conn.: Hobbs, 93a  
 Idaho, Bannock overthrust: Richards (R W), 12, 13e, 14a  
 Cocur d'Alene district: Ransome, 08  
 Gibbonsville: Bacon, 05  
 northern: Calkins, 09  
 Red Cloud mine: Turner (H W), 07b  
 Illinois, Cap au Grés: Keyes, 98n  
 Indiana, Coal Measures: Ashley, 98a  
 Mount Carmel: Logan, 18  
 Iowa: Keyes, 15p, 16d  
 Kansas, Meade Co.: Haworth, 96c  
 Kentucky, north central: Miller (A M), 16; western: Ulrich, 05  
 Landslide fault: Smith (R W), 14  
 Low-angle faulting: Chamberlin (R T), 18  
 Maine, Eastport quadrangle: Bastin, 14  
 Maryland, Glen Echo: Gilbert, 05e  
 Piedmont region: Mathews, 09a  
 Mass movement and depth of focus: Reid (H F), 10a  
 Massachusetts, fault in an esker: Lahee, 08b  
 Measurement: Spurr, 97  
 Mechanics of faults: Reid (H F), 10e  
 Mechanics of great overthrusts: Chamberlin (R T), 18a  
 Mexico, Coahuila: Haarman, 13  
 fault zones: Böse, 09a  
 Santa Eulalia: Knapp (M A), 06  
 Michigan, Keweenaw region: Lane, 16  
 Mineral veins: Raymond (R W), 82  
 Mississippi Valley: Keyes, 94e  
 Missouri, Newburg district: Lee (W), 11  
 southeastern: Buckley, 09  
 Springfield area, King-Ritter area: Ruhl, 04  
 Monoclinical ridges: Powell, 80a  
 Montana, Bitterroot Mountains: Lindgren, 05j  
 Butte district: Sales, 13; Weed, 12  
 Lewis and Livingston ranges: Willis, 02  
 Lombard overthrust: Haynes, 16a  
 Marysville district: Barrell, 07  
 northwestern: Calkins, 09  
 overthrust fault in nearly flat strata: Rogers (G S), 13b  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 13b  
 Nevada, Berlin mine: Daggett, 07n  
 Bullfrog district: Emmons (W H), 07b; Ransome, 10c  
 Carson area: Reid (J A), 11  
 Genoa: Lawson, 12b  
 Goldfield district: Cutler, 11  
 Robinson district: Lawson, 06  
 Tonopah district: Burgess, 09; Spurr, 04f

## Faulting—Continued.

Nevada: Washoe district: Becker (G F), 82  
 New Brunswick, St. John: Matthew (G F), 94e  
 New England, southwestern: Hobbs, 03a, d  
 New Jersey, Mesozoic: Lyman, 93  
 Perth Amboy district: Hawkins, 10  
 Sterling Hill: Farrington, 52a  
 Trenton quadrangle: Bascom, 09b  
 New Mexico, coal fields: Kirk (C T), 15  
 Estancia Plains: Keyes, 08b  
 Luna Co.: Darton, 14e  
 New York, Adirondacks: Newland, 08; trough faulting: Miller (W J), 10b  
 Broadalbin quadrangle: Miller (W J), 11b  
 central, overthrust faults: Schneider, 05; Wheelock, 05  
 Clinton Co., Chazy: Cushing, 95  
 eastern: Darton, 93; postglacial: Woodworth, 07  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Mohawk Valley: Darton, 97  
 North Creek quadrangle: Miller (W J), 14a  
 northern: Emmons (E), 42a  
 Onondaga Co., Marellus fault: Schneider, 99  
 overthrust faulting: Clarke (J M), 12  
 Rensselaer Co.: Ford (S W), 85  
 Rondout: Lindsley, 79  
 Saratoga Springs region: Cushing, 14  
 southeastern: Berkey, 11; Hobbs, 04a  
 Syracuse region: Schneider, 97  
 Thousand Islands region: Cushing, 10a  
 Trenton Falls: Miller (W J), 09  
 Ulster Co., Saugerties: Chadwick, 10  
 Nomenclature: Stevens (B), 14; Tolman, 07; Willis, 07b; and classification: Chamberlin (T C), 07; Cushing, 07b; Evans (J W), 07; Fairchild, 07b; Jaggar, 07; Ransome, 07; Reid (H F), 09a, 12b, 13a; Reid (J A), 07; Spurr, 07a  
 Normal compound and normal horizontal faults, genesis: Keyes, 00i  
 Normal faults, origin: Reade, 90; and hade: McGee, 83b  
 Nova Scotia, Battery Point: Fulton (T T), 06  
 Halifax Co., Moose River gold district: Woodman, 05  
 Pictou coal field: Gilpin, 88  
 Oblique faulting in Alaska: Martin (L), 07  
 Ohio, Richmond, coal bed: Huston, 83  
 Oklahoma, Arbuckle Mountains: Reeds, 10  
 Ontario, Espanola district: Quirke, 17  
 postglacial: Lawson, 11a  
 Seine River and Lake Shebandowan areas: McInnes, 99  
 Ore deposition, relation to faulting: Spurr, 16  
 Oregon, Cracker Creek district: Pardee, 09  
 southern: Russell, 84  
 Overthrust fault mechanism: Willis, 92b  
 Overthrust faulting: Chamberlin (R T), 18; Willis, 04  
 Panama Canal Zone: MacDonald (D F), 15  
 Pennsylvania: Ashley, 06e  
 Bucks Co., Chalfont: Lyman, 95e; Yardley: Lewis (H C), 82e; Lyman, 95b  
 Hollidaysburg quadrangle: Butts, 16b



## Faulting—Continued.

- Pennsylvania: Huntingdon and Centre cos.: Lesley (J P), 74c  
 Mercersburg-Chambersburg district: Stose, 09  
 middle: Lesley (J P), 74b  
 \* Perry Co., fault: Claypole, 84a  
 Pine Mountain fault: Stone (R W), 07d  
 South Mountain: Stose, 15  
 Trenton quadrangle: Bascom, 09b  
 Postglacial faults, eastern New York: Woodworth, 07; New Brunswick: Matthew (G F), 94b  
 Problems, methods of investigating: Tolman, 06  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 Rock fissure: Gilbert, 95f  
 Rocky Mountain faults: Washburne, 09c  
 Sierra Nevada fault blocks: Davis (W M), 07  
 South Dakota, Homestake ore body: Paige, 15  
 Systems of vertical faults, origin: Hobbs, 00a  
 Tennessee, Washington Co.: Lesley (J P), 72  
 Texas, El Paso quadrangle: Richardson (G B), 09  
 Franklin Mountains: Richardson (G B), 06c  
 Thrust planes in Great Basin ranges: Keyes, 09k  
 Topography, relation to: Spurr, 03f  
 Triassic, Connecticut Valley: Davis (W M), 88  
 Underthrust folds and faults: Smith (E A), 93  
 Utah, Bannock overthrust: Richards (R W), 12  
 high plateaus: Dutton, 80  
 Ogden Canyon: Talmage, 01a  
 Park City district: Boutwell, 12  
 Tintic district: Loughlin, 16c  
 Toquerville region: Huntington, 03, 04  
 Wasatch Mountains: Blackwelder, 10a; Hintze, 13; Loughlin, 13  
 Virginia, Piedmont region: Mathews, 09; Watson, 13d  
 southwestern: Bassler, 09; Squier, 84; Stevenson, 81d, 87, 87b  
 Wisconsin, joint system: Harder, 06  
 Wyoming, Big Horn Mountains: Darton, 06e  
 Hart Mountain overthrust: Dake, 18a  
 Faunal criteria in Paleozoic paleogeography: Bassler, 11e  
 Fayette gas field, Ala.: Munn, 11c  
 Fayetteville fauna: Girty, 10a  
 Fayetteville folio, Mo.-Ark. (no. 119): Adams (G I), 05  
 Featherstonhaugh, G. W., biography: Featherstonhaugh (J D), 89
- Feldspar.
- Alkaline, low-temperature formation: Daly (R A), 17d  
 Appalachian region, northern: Watts (A S), 16; southern: Watts (A S), 13  
 Canada: DeSchmid, 16  
 Determination: Winchell (N H), 98; in sections: Spurr, 03d  
 General: DeSchmid, 16; Hopkins (T C), 99a; Katz, 13; Ries, 97a, 01, 02; Winchell (N H), 95k  
 Isomorphism and thermal properties: Day (A L), 05a  
 Maine: Bastin, 07, 11  
 Maryland: Clark (W B), 09

## Feldspar—Continued.

- Melting phenomena: Bowen (N L), 13b  
 New England: Watts (A S), 16  
 New York, southeastern: Bastin, 07a  
 Ontario: Corkill, 06; DeSchmid, 12a, 13; Kingston district: Baker (M B), 13, 16; Mor-sack, 09  
 Feldspar regeneration: Winchell (N H), 03  
 Feldspars, perthitic, quantitative study: Warren (C H), 15  
 Quebec: De Schmid, 12a, 13  
 South Carolina: Sloan, 08  
 United States: Bastin, 10; U S G S, 83  
 Virginia: Watson, 07e  
 Fern Glen fauna: Weller, 09, 09c  
 Felidae: Adams (G I), 96b, 97  
 Fenestella, development: Cumings, 05  
 Ferberite: Hess, 14  
 Fernando group, Newhall, Cal.: English, 14  
 Fertilizers: Pogue, 17b  
 Ficus, new species: Knowlton, 11d  
 Field area, B. C.: Allan, 14  
 Field work.  
 Barometer, measuring heights by: Gilbert, 82a  
 Collecting fossils in the Cincinnati shales: Dickhaut, 99  
 Fossils in stratigraphic work: Schuchert, 13c  
 General; Anderson, 13; Ball (L C), 13; Foerste, 89b; Hartley, 13; Irving, 13, 13a; Ohern, 13; Richards (R W), 13; Smith (P S), 13e  
 Geologic mapping: Barnett, 13; Smith (F C), 13; Stebinger, 13  
 Geologic mensuration: Harris (G D), 04  
 Glacial geology: Leverett, 13  
 Handbook for field geologists: Hayes, 09  
 Inclined strata, thickness, calculation of: Chapman (E J), 60f  
 Magnesia, field test for: Catlett, 07a  
 Magnetic observations in geologic mapping: Smyth (H L), 97a, 07  
 Mapping: Lane, 89a  
 Measuring dip: Mosier, 13  
 Measuring strata: Blackwelder, 13; Woodruff, 13  
 Measuring thickness of inclined strata: Walcott, 89a  
 Measurements: Barrell, 13  
 Methods: Willis, 91; use of bicycle: Hobbs, 01f  
 Mine examiner and prospector's companion: Miller (G W), 07  
 Note taking: Purdue, 13d  
 Ohio, central, field trips: Prosser (C S), 10a  
 Ore deposits, field observation of: Emmons (S F), 07b  
 Penfield protractor: Calkins, 13  
 Planetable mapping: Gardner (J H), 13; Pelton, 12;  
 Ransome, 12a; Wegemann, 12b  
 Recording data: Clapp (C H), 13; Crawford, 13a; Kemp, 13; Kummel, 12; Smith (G O), 13b; Stose, 13a  
 Records, keeping: Kemp, 05a  
 Sections, construction in field work: Campbell (M R), 97b  
 Smithsonian: Smiths Inst, 13  
 Textbook: Lahee, 16  
 Wisconsin, lead and zinc district: Grant (U S), 04a



**Finger Lake basins**, origin: Von Engel, 18a

**Finger Lake region**, N. Y.: Carney, 07

**Fire clay**.

Canada: Ries, 13

Coal measures, origin: Hopkins (T C), 01

Colorado: Bailar, 08; Apishapa quadrangle: Stose, 12

General: Hopkins (T C), 98a

Georgia: Veatch (J O), 07

Illinois: Purdy, 07

Pennsylvanian: Lines, 17

Union Co., Mountain Glen: St. Clair, 17c

Missouri: Wheeler (H A), 05

St. Louis district: Fenneman, 07, 11

southern: Hughes, 11

North Dakota: Babcock, 06

Origin: Chance, 08a

Pennsylvania: Morganroth, 16

South Carolina: Sloan, 07

United States, eastern: Wilber, 83

**Fishers Island**, N. Y.: Fuller, 05r

**Fishes**. See Pisces.

**Fissure veins**, origin: Emmons (S F), 88a

**Fissures**. See Faulting.

**Fiords**.

Maine: Remmers, 91

Nature and origin: Johnson (D W), 15; Whitney, 80a

Puget Sound and the Saguenay: Upham, 08

**Flathead Lake region**, Mont.: Elrod, 03

**Flaxman Island**, Alaska: Leffingwell, 08

**Fletcher**, Hugh, biography: Brock, 09b; Schuchert, 09b

**Flint**. See also Chert.

General: Ries, 02

Maryland: Clark (W B), 09

Nebraska, Gage Co.: Barbour (E H), 09a

Origin: Griffing, 75

**Floating sand and stones**: Hovey, 00h; Simonds, 00b

**Florence iron district**, Wis.: Hotchkiss, 11

**Florence Lake district**, Ont.: Collins (W H), 10

**Florence oil field**, Colo.: Eldridge, 92; Washburne, 09b

**Florence shale fauna**, Kans.: Greene (F C), 08

**Florencia formation**: Hershey, 97c; Pilsbry, 98

**Florida**.

Bibliography: Sellards, 08d

Coral reef tract: Vaughan, 16

General: Agassiz (A), 85; Pierce, 25; Shepard, 33; Vaughan, 13, 14; Whiting, 38

Geologic investigations: Sellards, 08c

Keys, corals, and coral reefs: Vaughan, 11b

Keys, geology of: Vaughan, 09, 10

Reefs: Agassiz (A), 85; origin and growth: Hunt (E B), 63, 64

Sea bottom material: Matson, 10

Soil geology: Smith (E A), 84d

Soils: Sellards, 12a; classification: Sellards, 13

State geological survey, organization, and plans: Sellards, 07a

Survey reports: Sellards, 08, 18

Tampa Bay: Allen (J H), 46

Vero, climatic conditions: Wieland, 18b

West coast: Willcox, 84a

*Economic geology*.

Cement materials: Eckel, 13

Central Florida: Sellards, 15a

**Florida—Continued**.

*Economic geology—Continued*.

Clays: Matson, 09a; analysis: Hall (A A), 12

Floridite: Cox (E T), 91

Fuller's earth, Gadsden Co.: Sellards, 09; western Fla.: Vaughan, 02a, 03a

General: Kost, 87

Glass-sand deposits: Burchard, 07d

Gypsum: Day (D T), 04

Kaolin: Memminger, 94

Mineral industries: Sellards, 08b

Peat deposits: Forsaith, 16; Harper, 10

Phosphate: Brown (L P), 05; Codrington, 96;

Cox (E T), 90, 91, 91a, 96; Darton, 91d;

Eldridge, 93; Johnson (L C), 92b, 93;

Jumeau, 05; Ledoux, 90; Matson, 15; Mil-

lar, 91, 92; Sellards, 10, 11b, 14b, 15; Stone

(C A), 09; Van Horn (F B), 09; Wagga-

man, 11; Wells, 96; Wilson (F B), 92;

Wyatt, 90, 92

Albion district, Levy Co.: Cox (E T), 96a

map of phosphate deposits: Fla. G S, 13

origin: Cox (E T), 93; Davidson (W B M), 91; Sellards, 13a

Peace River Valley: Schrader, 91

Withlacoochee River district: Davidson (W B M), 92; Pratt (N A), 92

Phosphatic rocks: Hawes, 83; Johnson (L C), 85; Smith (E A), 85a

Phosphorite, Polk Co.: Goldsmith, 90

Rare mineral deposit: Liddell, 17

Road materials: Sellards, 11c

Sandstone deposit: Baker (T R), 93

Tallahassee region: Sellards, 17a

Western Florida: Sellards, 18a, c

*Historical geology*.

Alachua clays: Sellards, 14a

Alum Bluff formation: Berry, 16b

Anastasia Island: Dietz, 24

Apalachicola River: Dall, 94

Boring, Lake Worth: Darton, 91c; Key West: Hovey, 96

Central Florida: Sellards, 15a

Chattahoochee embayment: Johnson (L C), 92

Chipola Miocene, Alum Bluff: Foerste, 93a

Choctawhatchee marl, Walton Co.: Mansfield (W C), 16

Citronelle formation: Matson, 16

Eastern Florida: Conrad, 46b; Sellards, 10b

Eocene, Alligator: McCrady, 59a

General: Cox (E T), 96; Dall, 87, 15; Heilprin, 86b, 87a; Johnson (L C), 88a; Kost, 87a; Matson, 09b, 13a; Sellards, 08a; Smith (E A), 81a; Tuomey 51; Vaughan, 14

Geologic history of the Floridian Plateau: Vaughan, 10c

Grand Gulf and Lafayette formations: Clapp (F G), 08a

Hawthorn formation: Vaughan, 14d

Infusorial bed: Bailey (J W), 50

Miocene: Dall, 85b; Langdon, 89

Northern Florida: Foerste, 94

Nummulitic deposits: Heilprin, 82c, 86a

Ocala area: Sellards, 15a

Ocala limestone, age: Cooke (C W), 15, 16

Oligocene: Maury, 02; Tampa: Dall, 16b

Orthophragmina, stratigraphic value: Cooke (C W), 17



## Florida—Continued.

*Historical geology*—Continued.

- Peace Creek beds, age: Dall, 91  
 Phosphate districts: Matson, 15  
 Phosphatic rocks: Johnson (L C), 85; Smith (E A), 85a  
 Post-Eocene formations: Smith (E A), 06a  
 Southern Florida: Griswold, 96; Sanford, 09; Sellards, 15  
 Tallahassee region: Sellards, 17a  
 Tampa: Kerr, 85a  
 Tertiary: Dall, 90; Heilprin, 84a; Sellards, 16; correlation: Vaughan, 18d  
 Vero: Berry, 17h; Chamberlin (R T), 17, 17a; Hay (O P), 17b; Nelson (N C), 18; Sellards 16a, 17b, c, d; Vaughan, 17c  
 West coast: Heilprin, 87a  
 Western Florida: Sellards, 18a, c

*Mineralogy*.

- Meteorite, Eustis, Lake Co.: Merrill (G P), 18c; Lake Okechobee: Merrill, 16d  
 Vivianite, color change: Watson, 18f; Plant City: Watson, 18c  
 Wavellite: Moses, 92

*Paleontology*.

- Alum Bluff flora: Berry, 16b  
 Anastasia Island, Mollusca: Say, 24  
 Arcas: Sheldon, 17  
 Aves, Vero: Shufeldt, 17, 17a, 18  
 Boar, Florida: Leidy, 86a  
 Busycon (Fulgur), Oligocene: Aldrich, 07  
 Chlamytherium septentrionalis: Sellards, 15c  
 Choctawhatchee marl, Walton Co.: Mansfield (W C), 16  
 Conus, Tertiary: Aldrich, 03a  
 Diatomaceae, St. Augustine: Boyer, 95; Tampa: Bailey (J W), 51  
 Eocene, Tampa Bay: Conrad, 46e  
 Foraminifera: Heilprin, 85b; Coastal Plain: Cushman, 18  
 Human remains and associated fossils at Vero, Pleistocene: Hay (O P), 17d, 18, 18b; Hrdlička, 17, 18; MacCurdy, 17, 17a; Sellards, 16a, b, d, 17, 17b, d; Sterns, 18  
 Mammalia: Leidy, 84b, 87, 89b, 90, 90a  
 Ocala, Marion Co.: Leidy, 89d  
 phosphate beds: Sellards, 15  
 Mastodon and llama, Florida: Leidy, 86  
 Megatherium: Matthew (W D), 17f  
 Miocene snails: Pilsbry, 97a  
 Mitra from west Florida: Aldrich, 10  
 Mollusca, DeLand, Volusia Co.: Mansfield (W C), 18  
 Oligocene: Maury, 10; Tampa: Dall, 15  
 Tertiary: Aldrich, 03  
 Neocene: Olsson, 14  
 Ocala limestone fauna: Cooke (C W), 15  
 Orthophragmina: Cushman, 17  
 Planorbis, Pliocene: Pilsbry, 05  
 Polygyra, Pliocene: Johnson (C W), 99a  
 Ravenella, Eocene: McCrady, 59a  
 Rhinoceros and Hippotherium: Leidy, 85  
 Southern Florida: Sellards, 15  
 Tapir, Pleistocene, Vero: Sellards, 18b  
 Tertiary: Dall, 90  
 Testudo hayi: Sellards, 16c  
 Tiger: Leidy, 89a

## Florida—Continued.

*Paleontology*—Continued.

- Tomistoma, Polk Co.: Sellards, 15b, 16c  
 Vero fossils: Berry, 17g; Sellards, 16b, 17b  
 Plants: Berry, 17g, h, i  
 Vertebrata: Hay (O P), 16b, 17b, c; Sellards, 16, 17e, 18b  
 Vertebrata, Alachua clays: Leidy, 96; Peace Creek: Leidy, 89e  
 West coast: Heilprin, 87a

*Physical geology*.

- Bottom deposits, character: Vaughan, 15  
 Change of level of coast: Lewis (E), 66; west coast: Gorrie, 54  
 Coral reefs, formation: Le Conte, 80a, 83b, 93a; Horsford, 52, 56  
 General: Dall, 87  
 Gulf Coast, recent elevation: Vaughan, 02i  
 Peninsula, formation of: Le Conte, 57  
 Oolite, formation: Vaughan, 13a  
 Salinity of ocean-waters at Fowney Rocks, Fla.: Dole, 18  
 Sink-hole lakes, origin: Sellards, 06

*Physiographic geology*.

- Chattahoochee embayment: Johnson (L C), 92  
 Coast: Agassiz (L), 52  
 Coral reef areas: Vaughan, 14c, 15b  
 Dead Lake of Chipola River: Sellards, 16e  
 Elevated reef: Agassiz (A), 96  
 General: Kost, 87; Matson, 09b, 13a; Shaler, 90a; Smith (E A), 84d  
 Growth of peninsula and keys: Le Conte, 57  
 Gulf coastal plains: Sutherland, 08  
 Lakes and lake basins: Sellards, 10a, 14, 14e  
 Sink-hole lakes: Sellards, 06  
 Sinks: McCrady, 59a  
 Southern Florida: Griswold, 96; Sanford, 09  
 Tallahassee region: Sellards, 17a  
 West coast: Heilprin, 87a

*Underground water*.

- Artesian and other underground water: Sellards, 07; eastern Fla.: Sellards, 10b; and southern Fla.: Sellards, 13b  
 General: Fuller, 04c, 05i; Matson, 13a; Sellards, 14  
 Spouting well: Sellards, 11a  
 Springs: Shepard, 33  
 Underground water supply: Sellards, 08e; western Fla.: Sellards, 12a

Florida coral reef tract: Agassiz (A), 95a; Vaughan, 14c; geologic history: Vaughan, 14a

- Florida Keys: Vaughan, 09  
 Florida Mountains, N. Mex.: Becker (C M), 14b  
 Floridite: Cox (E T), 91  
 Florissant, a Miocene Pompeii: Cockerell, 08l  
 Florissant stone forest: Heilprin, 96a  
 Florissant Tertiary lake basin: Henderson (J), 06  
 Flow breccias: Patton, 15c  
 Fluorescein: Dole, 06  
 Fluorine in sericitization: Paige, 18  
 Fluorite.  
 Optical, southern Illinois: Pogue, 18  
 Tennessee: Watson, 07  
 Texas, Llano and Burnet quadrangles: Paige, 12  
 Virginia: Watson, 07e



**Fluorspar.**

- Colorado: Burchard, 09b; Mineral Co. Lunt, 15  
 General: Bruce, 14a; Hovey, 06l; Pratt, 02b  
 Illinois, southern: Brush, 52; Burk, 01; Bain,  
 04d, f, 05b; Emmons (S F), 93c; Rosiclare:  
 Burchard, 11d  
 Kentucky: Fohs, 07, 09; central: Fohs, 10a;  
 western: Burk, 01; Fohs, 10  
 New Mexico: Burchard, 11c; Deming: Darton,  
 11a  
 United States: U S G S, 83  
 Flushing quadrangle, Ohio: Griswold, 08  
 Fluvialite and lacustrine beds, criteria for distin-  
 guishing: Davis (W M), 00c  
 Folded strata, Trenton Falls: Miller (W J), 09  
**Folding.**  
 Anticlinal domes in Piedmont of Maryland:  
 Mathews, 07  
 Anticlinal flexures: Rogers (W B), 58  
 Anticlinal folds: Hopkins (T C), 02  
 Anticlinal ridges, postglacial: Gilbert, 91  
 Appalachians: Margerie, 92a  
 Arcuate mountains, formation: Hobbs, 14a  
 Arkansas: Ashley, 97; slate area: Purdue, 10  
 Atlantic Coastal Plain: Hollick, 94f  
 British Columbia, Hedley district: Camsell, 10a  
 California, Coast Range: Le Conte, 76  
 Inyo Co.: Walcott, 95e  
 San Diego Co., folded vein: Fairbanks, 94f  
 Carboniferous, maritime provinces of Canada:  
 Gilpin, 83  
 Cause: Meigs, 80  
 Colorado, Denver region: Eldridge, 90  
 northern, foothills: Ziegler, 17b, c  
 northwestern: Gale, 10  
 Connecticut, Preston region: Loughlin, 12  
 General: Billings, 60f; Dana (J D), 47a; Hobbs,  
 14a; Lahee, 12a; Martin (D S), 89;  
 Nason, 09; Rogers (H D), 58d; Van  
 Hise, 95e, 96; Walling, 79  
 Glacial: Carney, 07a; Sardeson, 06  
 Idaho, southeastern: Richards (R W), 13b  
 Illinois, deformation lines: Weller, 06a, b  
 Marquette iron district: Van Hise, 94  
 Mexico: Nason, 09  
 Cananea: Blake (W P), 04e  
 Coahuila: Haarman, 13  
 Minnesota, Cuyuna Range: Adams (F S), 10  
 Mississippi Valley: Keyes, 94e  
 Montana, Lombard overthrust: Haynes, 16a;  
 Philipsburg quadrangle: Calkins, 15; Em-  
 mons (W H), 13b  
 New Brunswick, gypsum deposits: Andrée, 14  
 New Jersey, Perth Amboy district: Hawkins,  
 10  
 New Mexico, Lake Valley district: Keyes, 08  
 New York, Adirondack region: Miller (W J),  
 16b  
 central: Williams (H S), 83c  
 St Lawrence Valley: Chadwick, 15  
 Thirtymile Point: Gilbert, 99b  
 Thousand Islands region: Cushing, 10a  
 Trenton Falls: Hahn, 13; Miller (W J), 08  
 Watkins Glen quadrangle: Kindie, 04c  
 Nova Scotia, auriferous beds: Prest, 95  
 Halifax Co., Moose River gold district:  
 Woodman, 05  
 Pietou coal field: Gilpin, 83

**Folding—Continued.**

- Ohio, in Chagrin shales at Cleveland: Van  
 Horn (F R), 10a  
 Oklahoma, Arbuckle Mountains: Reeds, 10  
 Ontario, Espanola district: Quirke, 17; Lor-  
 raine shales: Wilson (A W G), 02a  
 Pennsylvania: Claypole, 85b; Margerie, 87  
 Appalachian region: Chamberlin (R T), 10  
 Huntingdon and Centre cos.: Lesley, 74c  
 Kittanning coal, distortion in: Hise, 11  
 Meadville, anticlinal folds: Smallwood, 03  
 Mercersburg-Chambersburg district: Stose,  
 09  
 middle: Lesley, 74b  
 South Mountain: Stose, 06  
 Quebec, Haliburton, and Baneroft areas:  
 Adams (F D), 10d  
 Rock folds due to weathering: Campbell (M R),  
 06c  
 Rocky Mountains: Hills, 91c  
 Separation of strata in folding: Bulkley, 85  
 Synclines of deposition: Willis, 94  
 Synclinerium and anticlinorium: Rice (W N),  
 06b  
 Thrusts and recumbent folds: Willis, 07d  
 Tongue structure in folded anticlinals: Lesley,  
 62  
 Underthrust folds and faults: Smith (E A), 93  
 Utah, northeastern: Gale, 10; Uinta Range:  
 Weeks, 07  
 Vertical component in local folding: Gardner  
 (J H), 17a  
 Wisconsin, Baraboo quartzite range: Steidt-  
 man, 10  
 Foliation, Thousand Islands region, N. Y.: Cush-  
 ing, 10a  
 Fontaine, W. M., biography: Watson, 14b  
 Foote, A. E., biography: Kunz, 96  
**Footprints, fossil.**  
 Amphibia: Matthew (G F), 03a, b, c, d, 05  
 Mississippian, Virginia: Branson, 10  
 Arizona, Grand Canyon: Lull, 18b  
 Batrachopus: Lull, 04a  
 Colletosaurus indianensis: Cox (E T), 74b  
 Colorado, St. Vrain Creek: Parker (H W), 85  
 Connecticut, Triassic: Adams (C B), 46a; Lull,  
 12b  
 Connecticut Valley: Barratt, 45; Bouvé, 59a;  
 Cushman, 04; Deane, 44, 44a, 45, 45a, b, e,  
 47, 47a, 48, 49, 50, 56, 61; Field, 60a; Hitch-  
 cock (C H), 71d, 98; Hitchcock (E) 36, 36a,  
 37, 41, 43b, 45, 45b, 47, 48, 54, 56, 57b, 58, 63a,  
 65, 66; Lull, 04, 07b, 15, 17a; Lyell, 42d;  
 Marsh (D), 48; Mantell, 46; Mitivier, 92;  
 Shepard, 67a; Warren (J C), 54; Wieker-  
 sham, 46  
 Dinosaur tracks in Glen Rose limestone: Shu-  
 ler, 17a  
 Dinosaurian, Jurassic: Marsh, 99  
 Arizona: Riggs, 04a  
 General: Dawson (J W), 73d; Hitchcock (C  
 H), 73e; Hitchcock (E), 61a; Russell, 77;  
 Wyman, 55c  
 Hylopus: Matthew (G F), 04b  
 Interpretation: Lull, 05c  
 Kansas: Mudge, 66a, 74a  
 bird track: Snow, 87; Coal Measures, verte-  
 brates: Marsh, 94c; Moodie, 13



## Footprints, fossil—Continued.

- Labyrinthodont: Warren, 56  
 Maryland, Frederick Co., Newark rocks: Mitchell, 95  
 Massachusetts, Plainville: Woodworth, 00  
 Missouri, Kansas City, footprints: Butts, 91  
 Nevada, Carson City: Blake (W P), 84c; Cope, 83zd; Davidson (G), 86; Louderback, 07a; Le Conte, 82, 83c; Marsh, 83b; Rath, 84c; Stock, 17b  
 New Brunswick, Little River group: Matthew (G F), 10c  
 New Jersey, Hunterdon Co.: Eyermann, 89b  
 New York, Clinton group, Niagara Falls: Owen (R), 52  
 Nicaragua, Managua: Johnson (G H), 84  
 Nova Scotia, Antigonish Co., Knoydart formation: Ami, 02a  
 Cape Breton, reptilian: Dawson (J W), 63e  
 Carboniferous: Dawson (J W), 63, 72c; Amphibia: Matthew (G F), 05  
 South Joggins: Dawson (J W), 82; Matthew (G F), 03d  
 recent footprints on red mud: Lyeñ, 49a  
 reptilian: Selwyn, 72c  
 Oklahoma, Pennsylvanian: Jillson, 17  
 Ornithichnites, reptilian origin: Field, 60  
 Otozoum, Connecticut Valley: Hitchcock (E), 56c  
 Pennsylvania: Lyell, 46b; Rogers (H D), 55a  
 Carboniferous: Rogers (H D), 51c; Williams-town: Leidy, 79a  
 Devonian: Marsh, 96d  
 Greensburg, reptilian: Lyell, 48  
 Pittston, reptilian: Lacoe, 82  
 Pottsville: Lea, 49, 50  
 Schuylkill Co.: Lea, 53b  
 Triassic: Hitchcock (C H), 89b  
 western, Carboniferous: Moore (W D), 73  
 Westmoreland Co.: King (A T), 44, 45, 45a, b; Lyell, 46f  
 Protichnites: Dawson (J W), 62c  
 New York: Marsh, 69  
 Potsdam sandstone, Quebec: Owen (R), 52a  
 Protichnites and Climactichnites: Burling, 17a  
 Quebec, Beauharnois: Lyell, 51; Potsdam sandstone: Logan, 51, 60; Owen (R), 51a  
 Reptilia: Lull, 04b  
 Salamander-like, Texas Permian: Williston, 08c  
 Sauropus, Pottsville, Pa.: Lea, 53b  
 Sauropus primaevus, Pennsylvania: Lea, 49a, 53b  
 Stegomus: Lull, 04a  
 Tracks on alluvial clay: Hitchcock (C H), 55  
 Turners Falls, Mass. See Connecticut Valley.  
 Foraker quadrangle, Okla.: Heald, 16
- Foraminifera.  
 Alabama chalk: Cunningham, 94b  
 Atlantic slope, Tertiary and Pleistocene: Bagg, 98b  
 Barbados: Chapman (F), 98; Ehrenberg, 73; Franks, 98; Jukes-Browne, 91  
 Bermuda Islands: Bullen, 11  
 Bibliography: Woodward (A), 86  
 California: Ehrenberg, 70, 70a, 72  
 Monterey: Bagg, 05

## Foraminifera—Continued.

- California: Pliocene and Pleistocene: Bagg, 12  
 Santa Barbara: Bagg, 05c; post-Pliocene: Woodward (A), 89  
 Tertiary: Chapman (F), 00  
 Carboniferous, Illinois: Bagg, 09a  
 Cristellaria, Ripley group, Ala.: Schlumberger, 82  
 Cuba: Orbigny, 39; Orbitoides: Kemp, 15  
 Descriptions: Bailey (J W), 42, 42a  
 Endothyra ornata: White (C A), 80a  
 Florida: Heilprin, 85b  
 Fusulina cylindrica, shell structure: Smith (A J), 99  
 Fusulinidae: Staff, 12  
 General: Bailey (J W), 41a, 42; Ehrenberg, 43, 54  
 Guadalupian fauna: Girty, 08  
 Index to genera and species: Sherborn, 93  
 Indiana, Salem limestone: Beede, 06, 06a  
 Iowa, chalk: Calvin, 95  
 Jamaica: Brady, 76; Jones (T R), 76; Tertiary: Moore (J C), 63  
 Kansas, Cretaceous McClung, 98; Carboniferous, Hooser: Spandel, 01  
 Loftusia, British Columbia: Dawson (G M), 79b  
 Manitoba, Cretaceous: Dawson (G M), 74b; Dawson (J W), 76b; Tyrrell, 91b  
 Maryland: Ehrenberg, 44  
 Mexico: Ehrenberg, 69; Toluca Valley: Ehrenberg, 66  
 Minnesota, Cretaceous: Woodward (A), 95  
 Meeker Co.: Woodward (A), 85  
 drift deposits: Leidy, 84a  
 New Jersey, Cretaceous: Bagg, 95a, 98a; Reuss, 61; Woodward (A), 94  
 Niobrara chalk: Calvin, 94b  
 Nummulites: Heilprin, 82c; Florida: Heilprin, 85b  
 Orbitoides, Lower California: Douvillé, 15a; West Indies: Jones (T R), 64  
 Orbitoides beds: Douvillé, 18  
 Orthophragmina, Georgia and Florida: Cushman, 17; stratigraphic value: Cooke (C W), 17  
 Panama, Pleistocene: Cushman, 04a  
 Panama Canal Zone: Cushman, 18a, b; Douvillé, 15b  
 Pliocene and Miocene, Coastal Plain: Cushman, 18  
 Porocystis Cragin: Jarvis, 05  
 Pre-Cambrian: Matthew (G F), 95g  
 Saccamina: Dawson (J W), 89d  
 South Carolina, Charleston: Bailey (J W), 45b, Trinidad: Guppy, 92, 93, 94, 95, 98a, b, 09a  
 Naparima: Guppy, 04a  
 Orbitoides: Douvillé, 15, 17  
 San Fernando: Guppy, 72  
 Tertiary: Guppy, 64; Jones (T R), 66  
 Triticites: Girty, 04a  
 Virginia: Ehrenberg, 44  
 Forest fire: Matthew (G F), 00a  
 Formation of rocks: Maclure, 32  
 Fort Benton folio, Mont. (no. 55): Weed, 99  
 Fort Berthold Indian Reservation lignite field N. Dak.: Smith (C D), 09a  
 Fort Hall district, Idaho: Weeks, 08a  
 Fort McKinney folio, Wyo. (no. 142): Darton, 06d



- Fort Monroe area, Va.:** Stephenson (L W), 18a  
**Fort Peck Indian Reservation lignite field, Mont.:**  
     Smith (C D), 09b  
**Fort Stanton Reservation, N. Mex., coal:** Campbell  
     (M R), 07c  
**Fort Union formation:** Weed, 96e  
**Fortymile district, Alaska:** Prindle, 08b, 09  
**Fossil forests.** *See* Petrified forests.  
**Fossil fuels, interrelations:** Stevenson, 16  
**Fossil skeletons, modern methods of excavating,**  
     preparing, and mounting: Hermann, 08  
**Fossilization:** Dale, 79c; Gratacap, 96; Hartzell, 06;  
     Morris (C), 85; White (C A), 79a  
     **Mazon Creek fossils, mode of preservation:**  
         Pike, 80  
     **Plants, preservation:** Hollick, 05b  
     **Ring structures in silica:** Stansfield, 18a  
     **Wood replaced by calcite:** Greenland, 18  
**Fossil Ridge, Colo.:** Henderson (J), 08a  
**Fossils.** *See* Paleontology.  
**Fossils in drift, Louisiana:** Hopkins (F V), 72  
**Foundry sands:** Ries, 08a  
**Fourmile placer mining district, Colo.:** Hoover, 97  
**Foxburg quadrangle, Pa.:** Shaw (E W), 11b, e  
**Foxburg-Clarion folio, Pa. (no. 178):** Shaw (E W),  
     11j  
**Fox Hills group, Colo.:** Stevenson, 79a  
**Fox Hills sandstone:** Knowlton, 16; Stanton, 10a  
**Fox River valley, Wis.:** Hobbs, 07i  
**Fractional crystallization of rocks:** Becker, 97b  
**Fracture, law of:** Owen (R), 83a  
**Fracture systems, correlation:** Hobbs, 05b; spacing;  
     Scott (I D), 14  
**Fracturing, northern Vermont:** Hitchcock (C H),  
     95e  
**Fram Expedition:** Bugge, 10; Triassic fossils:  
     Kittl, 07  
**Franciscan sandstone:** Davis (E F), 18  
**Franklin.**  
     **Hudson Bay region:** Low, 05  
     **Hudson Strait:** Bell (R), 98a, 01  
     *Historical geology.*  
         **Geology of the lands visited by the Neptune:**  
             Low, 06  
     *Mineralogy.*  
         **Prehnite, Adams Sound:** Johnston (R A A),  
             13; **Admiralty Inlet, Baffinland:** Sim-  
             mersbach, 17a  
     *Paleontology.*  
         **Corals from Arctic Islands:** Lambe, 06  
         **Ordovician and Silurian fossils:** Ami, 06, 06a  
**Franklin folio, W. Va.-Va. (no. 32):** Darton, 96c  
**Franklin mining camp, B. C.:** Brock, 07a; Drys-  
     dale, 15  
**Franklin Furnace folio, N. J. (no. 161):** Kümmel,  
     08c  
**Franklin Furnace quadrangle:** Spencer (A C), 08d  
**Franklin Mountain region, Tex.:** Chauvenet, 10  
**Franklin Mountains, Tex., tin:** Richardson (G B),  
     06a  
**Franklin white limestone, Sussex Co., N. J.:**  
     Wolff, 98  
**Fraser Canyon, B. C.:** Camsell, 12  
**Frazer, Persifor, biography:** Harrison (A C), 09;  
     Penrose, 10a  
**Fredericksburg folio, Md.-Va. (no. 13):** Darton,  
     94d  
**Freezing caverns:** Balch, 00  
**French River sheet, Ont.:** Bell (R), 98  
**Frenelopsis ramosissima, epidermal characters:**  
     Berry, 101  
**Frigites:** Barbour, 13c, 14g  
**Frogs:** Moodie, 14a  
**Frost, action in arranging earthy material:** Kerr.  
     81a  
**Frost cracks, fossil:** Udden, 95  
**Frost drift, North Carolina:** Kerr, 76  
**Fucoids.**  
     **Alaska, Yakutat fauna:** Ulrich, 04a  
     **Cincinnatian:** James (J F), 84, 85c  
     **General:** James (J F), 90f, 93; Newberry, 85b  
     **Mississippian:** Miller (S A), 97  
     **Rusophycus:** Dawson (J W), 64a  
**Fuel oil in the Southwest:** Phillips (W B), 14a  
**Fuels, fossil, interrelations:** Stevenson, 16  
**Fulgurites.**  
     **Colorado, Spanish Peaks:** Hills, 91b  
     **Formation:** West, 43  
     **General:** Barrows (W L), 10; Julien, 01; Merrill  
         (G P), 86, 87  
     **Lightning effects:** Hallock, 01  
     **Maine, Waterville:** Bayley, 92b  
     **North Carolina, Fayetteville:** Leeds, 74  
     **Oregon, Mount Thielson:** Diller, 84d, e  
     **Wisconsin, Sparta:** Shipton, 16; spiral: Hobbs,  
         99a  
**Fuller, H. T., biography:** Hovey, 10b  
**Fuller's earth.**  
     **Arkansas:** Branner, 12; Miser, 13  
     **California:** Aubury, 06  
     **Florida, Gadsden Co.:** Sellards, 09  
     **General:** Middleton, 11; Parsons (C L), 13;  
         Porter, 07; Van Horn (F B), 08a  
     **Georgia:** McCallie, 10; Coastal Plain: Shearer,  
         17  
     **Iowa:** Cook (A N), 04  
     **Massachusetts, near Clinton:** Alden, 10a  
     **South Carolina:** Sloan, 07, 08  
     **Southern States:** Sellards, 14d  
     **Virginia:** Watson, 07e  
     **United States:** Day (D T), 00  
**Fundamental problems of geology:** Chamberlin  
     (T C), 04b, 05  
**Fungi:** James (J F), 93b  
**Fungus, supposed:** James (J F), 85b  
**Fusulina, nomenclature:** Girty, 14; Ohio: Verneuil,  
     46  
**Fusulina cylindrica, occurrence:** Owen (D D), 52e  
**Fusulinidae:** Staff, 12  
**Fusus, phylogeny:** Grabau, 04  
**Gabb, W. M., biography:** Dall, 09  
**Gabbro, orbicular, Dehesa, Cal.:** Kessler, 04  
**Gadsden folio, Ala. (no. 35):** Hayes, 96  
**Gaines folio, Pa.-N. Y. (no. 92):** Fuller, 03  
**Gaines oil field, Pa.:** Fuller, 02a  
**Galena limestone, age:** Winchell (N H), 95e  
**Galena series:** Sardeson, 96, 07; intraformational  
     conglomerates in: Sardeson, 98; nomen-  
     clature: Sardeson, 97  
**Galena-Elizabeth folio, Ill.-Iowa (no 200):** Shaw  
     (F W), 16  
**Galena-Joplin lead-zinc region:** Haworth, 04  
**Gallatin Mountains:** Iddings, 99  
**Gallina quadrangle, N. Mex.:** Case, 12b



*Gallinuloides wyomingensis*: Shufeldt, 15b  
*Gallium*: Browning, 17b  
 Gallup Basin, N. Mex.: Kirk (C T), 14  
 Galt coal field, Alta.: Hardie, 10  
*Gamponychidae*: Packard (A S), 86a  
*Ganister*, Blair Co., Pa.: Butts, 09  
*Ganodonta*: Wortman, 97  
 Garnet.  
     Arizona and Utah, Navajo Reservation:  
         Gregory (H E), 16b  
     Georgia, Porter Springs district: Richard, 11a  
     New York, North Creek quadrangle: Miller  
         (W J), 14a; Warren Co.: Miller (W J)  
         12, 13a  
     Virginia: Watson, 07e  
 Garnet district, Mont.: Rowe, 10d  
 Garnet group, relations of properties: Ford (W E),  
     15b  
 Garnet zones, origin: Lindgren, 14c  
 Gas. *See* Natural gas.  
 Gases in rocks: Chamberlin (R T), 09  
 Gaspé, Que.: Clarke (J M), 08d; Mailhot, 11  
 Gastroliths: Cannon, 06a; Brown (B), 07a; Hares  
     17; Moodie, 12a; Wieland, 06c, 07  
 Gastropoda. *See also* Mollusca.  
     Actaeon, San Diego, Cal.: Stearns, 97, 98  
     Actaeonidae: Meek, 63  
     Alabama, Claiborne fauna: Aldrich, 07a, 08;  
         Heilprin, 79; Lea (H C), 41; Wheeler  
         (H E), 10  
         Eocene: Aldrich, 98  
         Tertiary: Aldrich, 85a  
     Alabina: Bartsch, 11  
     Alvania from west coast of America: Bartsch,  
         11d  
     Amastra, Hawaii: Cooke (C M), 17  
     Ammonitella lunata: Edson, 11  
     Anisomyon, Nebraska: Meek, 60  
     Antigua, Oligocene: Brown (A P), 14a  
     Aporrhaidae: Gabb, 68, 69b  
     Arizona: Cockerell, 05a; Mesozoic, fresh-water:  
         Robinson (W I), 15  
     Ashmunella, New Mexico: Cockerell, 03  
     Auburn chert fauna, Missouri: Branson, 09  
     Bathytoma, Pleistocene, San Pedro: Rivers, 13  
     Bellerophon, Carboniferous: Conrad, 44  
     Bellerophon, etc.: Hall, 61a  
     Bellerophontidae, affinities: Meek, 66b  
     Bittium, San Pedro, Cal.: Dall, 01d; west coast  
         of America: Bartsch, 11c  
     British Columbia, Vancouver Island, Tertiary:  
         Merriam, 97a  
     Busycon: Conrad, 67d  
     Busycon (Fulgur), Oligocene, Florida: Aldrich,  
         24  
     Busycon cretaceum, Tennessee: Wade, 17c  
     California, Coalinga district: Arnold, 09a; Nom-  
         land, 16a  
         Colorado Desert: Stearns, 01  
         Pleurotomidae: Buell, 11  
         southern, Tertiary: Arnold, 07b; English, 14a;  
         Stearns, 76  
     Calyptraeidae: Keyes, 90e  
     Calyptraphorus, Eocene, Alabama: Conrad, 57b  
     Cambrian, phylogenic stage: Sardeson, 03  
     Campeloma: Call, 86

## Gastropoda—Continued.

*Cancellaria*, Dauphin Co., N. C.: Johnson  
     (C W), 04  
     Eocene, Alabama: Aldrich, 97a  
     Ripley group: Miller (S A), 82b  
*Capulus*: Hall, 59b; Keyes, 90a, e  
*Carinifex*, Santa Clara lake beds, Cal.: Hanni-  
     bal, 09  
*Cerithiopsis*, west coast of America: Bartsch, 11b  
*Chazy*: Raymond (P E), 08  
*Cincinnati*: Miller (S A), 74d  
*Clavilithes*, Eocene, Texas: Johnson (C W), 02  
*Coal Measures*, Texas: Shumard (B F), 60c  
 Color markings: Roundy, 14  
 Colorado, Florissant: Cockerell, 06a; Lykins  
     fauna: Girty, 12  
*Columbella*, post-Pliocene, South Carolina:  
     Ravenel, 59  
*Conularia*, Galena, Ill.: Conrad, 54b  
*Conularia vernuelia*, Carboniferous, Iowa:  
     Emmons (E), 46g  
*Conus*, Florida: Aldrich, 03a  
 Cretaceous, generic names: Wade, 18  
*Cypraea*, Cretaceous, Montana: Campbell (J  
     H), 92  
*Cyrtolites*, Cincinnati: James (U P), 72  
*Dawsonella*: Bradley, 74  
 Devonian: Clarke (J M), 07a  
*Diastoma*, west coast: Bartsch, 11a  
*Ecphora*, Chesapeake Miocene: Pilsbry, 11a  
*Euconospira*, color-marked: Greger, 17  
*Fissurellidae*, catalog: Pilsbry, 92  
 Florida, Miocene snails: Pilsbry, 97a; Oligo-  
     cene: Maury, 10  
 Floyd, Hackberry group, Iowa: Webster, 05  
 Fresh-water shells, Carboniferous, Nevada:  
     Walcott, 83f  
 Fulgur: Gill, 67; Grabau, 03c; Smith (B), 15;  
     genesis: Maury, 09  
*Fusidae*, phylogeny: Grabau, 03g, 04  
 General: Grabau, 02b, 03c  
*Goniobasis*, Tertiary: Conrad, 69c  
 Guelph formation: Nicholson, 75e  
 Hackberry group, Iowa: Webster, 05a, 06  
*Helicina occulta*: Shimek, 04d  
*Hercynella*: O'Connell, 14a  
*Hyalithes* and *Acrothyra* compared: Matthew  
     (G F), 01  
*Hyalithes opercula*: Ford (S W), 71  
 Illinois, Vermilion Co., Coal Measures land  
     snails: Bradley, 72  
 Iowa, Burlington: Keyes, 89f  
     Hackberry group: Webster, 05, 05b, 09  
     Mississippian: Hall, 59j  
     Rockford shales: Webster, 83a  
 Lignitic stage: Harris, 99  
*Limnaea*: Hannibal, 18  
*Limnaea florissantica*: Cockerell, 11b  
*Limnaeid*, post-Pliocene, California: Call, 88  
*Lispodesthes*, Cretaceous, Iowa: White (C A),  
     88a  
*Lymnaeidae* of North and Middle America:  
     Baker (F C), 11  
*Maclurea*, Manitoba: Whiteaves, 90  
 Manitoba, Trenton: Whiteaves, 93a  
 Martinique, Miocene Mollusca: Cossmann, 13  
 Maryland, Devonian: Clarke (J M), 13e; Ohern,  
     13b; Prosser, 13c



## Gastropoda—Continued.

- Massachusetts, *Vitrinella*: Clapp (W F), 14  
 Mexico, Cerro de Muleros: Böse, 10  
 Miocene Scala, Alaska: Dall, 08  
 Miocene species of *Limnaea*: Cockerell, 08g  
 Mississippi, Tertiary: Aldrich, 85a, 94  
 Montana, Cretaceous: Meek, 56, 56a, b  
 Moorefield shale fauna: Girty, 11  
 Myacites, Triassic, Pennsylvania: Conrad, 57d  
 Nassa, Texas: Aldrich, 01  
 Nassa peralta: Harris, 91b  
 Naticopsis: Girty, 12a; Keyes, 89c  
 New Brunswick, St. John group, *Hyolithes*:  
 Matthew (G F), 01a  
 New Jersey, Cretaceous: Whitfield, 93a; Pleu-  
 rotomidae: Pilsbry, 12  
 Cretaceous and Tertiary: Whitfield, 92  
 Eocene, *Fasciolaria*: Whitfield, 05b  
 New Mexico: Cockerell, 05a  
 New York, Silurian: O'Connell, 14a  
 Nova Scotia, Carboniferous pulmonates: Daw-  
 son (J W), 76g  
 Omalaxis, Eocene, Texas: Aldrich, 90  
 Ontario, Guelph formation: Nicholson, 75e  
 Opercula, paucispiral, Guelph formation:  
 Whiteaves, 91c  
 Ordovician, Minnesota: Ulrich, 97b; retaining  
 color markings: Raymond (P E), 06a  
 Oreohelix, New Mexico: Cockerell, 05  
 Orthogenetic variation: Grabau, 07a  
 Panama, Miocene Mollusca: Cossmann, 13  
 Park City formation phosphate beds fauna:  
 Girty, 10  
 Phylogeny of certain Cerithiidae: Wood (El-  
 vira), 10  
 Physa, New Mexico: Springer, 02  
 Planorbis, Florissant, Colo.: Cockerell, 06a  
 Platyceras: Keyes, 88c, 90a, 92b; attachment to  
 crinoids: Keyes, 88f, 89; sedentary habits:  
 Keyes, 92k; variation: Keyes, 89b  
 Platystoma: Hall, 59c  
 Pleurotoma, Pliocene, California: Raymond  
 (W J), 04  
 Pleurotomaria, Colorado: Meek, 74; Cretaceous,  
 New Jersey: Pilsbry, 96; Devonian,  
 Missouri: Broadhead, 96  
 Pleurotomidae: Casey, 04  
 Pliocene, Florida: Pilsbry, 05; Georgia: Aldrich,  
 11a  
 Polygyra, Pliocene, Florida: Johnson (C W),  
 99a  
 Polyphemopsis: Keyes, 89g  
 Protoconch: Grabau, 02b; value in classifica-  
 tion: Grabau, 12  
 Protocalyptraea, New York: Clarke (J M), 94d  
 Psilocochlis: Dall, 07b  
 Pteraulima, Eocene, Louisiana: Casey, 02a  
 Ptychosalpinx: Gill, 67a  
 Pyramidellidae: Dall, 04b  
 Pyramidula shimekii: Shimek, 01a  
 Pyrgulifera: White (C A), 85e  
 Ranellidae: Dall, 04a  
 Rissoina, Pacific States: Bartsch, 15  
 Senility: Smith (B), 05  
 Solarium, Eocene, Alabama: Aldrich, 95a  
 Soleniscus: Keyes, 89a; White (C A), 83j  
 South Dakota, Cretaceous: Meek, 56, 56a, b

## Gastropoda—Continued.

- Sphaerodoma: Keyes, 89h  
 Spirorbis, Mazon Creek: Dawson (J W), 81a  
 Stenotheca: Matthew (G F), 85e, 89c  
 Straparollus, Iowa: Keyes, 90  
 Strombidae: Gabb, 68, 69b  
 Strophostylus: Hall, 59c; Keyes, 90d; evolu-  
 tion: Keyes, 92l  
 Sysotypus: Conrad, 67d; Grabau, 03c  
 Tejon fauna: Dickerson, 15  
 Tennessee, Cretaceous: Wade, 17d, e  
 Tentaculites: Nicholson, 72a, d  
 Terebellum: Harris, 90  
 Tertiary, West: Cockerell, 12a, 15  
 Trematodus: Newton, 92  
 Triton: Dall, 04a  
 Turbinella, Richmond Co., Ga.: Dall, 04c  
 Turritellidae, viviparous, Miocene: Burns, 99  
 Tylostoma, Puebla, Mex.: White (C A), 81f  
 Volutidae: Dall, 07, 07a  
 Westerna, Hackberry group, Iowa: Webster,  
 05a  
 Wisconsin, operculated gastropod from Niagara:  
 Teller, 10  
 Wyoming, Tertiary: Cockerell, 14b  
 Zonites, Carboniferous, Nova Scotia: Dawson  
 (J W), 67  
 Zonitoid shell, Florissant, Colo.: Cockerell, 07k  
 Gatun fauna, Panama: Brown (A P), 11a; Toulou, 11a  
 Geest: Dryer, 03; Hitchcock (E), 23; McGee, 02b  
 Geinitzia gracillima: Jeffrey, 11  
 Gems. *See also* Precious stones.  
 Arizona: Culin, 17a  
 California: Kunz, 05  
 Fluorescent gems: Levison, 03  
 General: Farrington, 03; Schaller, 16d; Sterrett,  
 07d  
 Occurrences: Kunz, 91b  
 Pacific coast States: Maguire, 00  
 South Carolina: Sloan, 07, 08  
 United States: Hamlin, 70; U. S. G. S., 83  
 U. S. National Museum, gem collection: Kunz,  
 89; Tassin, 02  
 Various: Kunz, 86d  
 Virginia: Watson, 07e  
 General works on geology.  
 Geological account of the United States: Mease,  
 07  
 Lectures on geology: Lyell, 42  
 Outline of geology: Hitchcock (E), 53  
 Principles of geology: Heilprin, 90  
 Genesee shale and Tully limestone, relationship:  
 Grabau, 17  
 Genesee Valley: Fairchild, 00g  
 Genesis of ores. *See* Ore deposits, origin.  
 Geneva quadrangle, N. Y.: Luther, 09  
 Genoa quadrangle, N. Y.: Luther, 10  
 Genth, F. A., biography: Barker, 02  
 Geochemistry.  
 Abstraction of oxygen from atmosphere by iron:  
 Smyth (C H), 05  
 Abstraction of potassium during sedimentation:  
 Watson (J W), 13  
 Alkali lake waters: Chatard, 88  
 Analyses of igneous rocks: Washington, 17  
 Analyses of rocks: Clarke (F W), 97, 00b; Mexico:  
 Mex I G, 13b



## Geochemistry—Continued.

- Analysis of rocks: Connor, 13  
 Analysis of silicate and carbonate rocks: Hillebrand, 07  
 Binary system  $MgO-SiO_2$ : Bowen (N L), 14b  
 Bornite as silver precipitant: Palmer (C), 15  
 Calcite, solubility in water: Wells, 15b  
 Calcium carbonate, the several forms: Johnston (J), 16a  
 Calcium vanadates: Hillebrand, 13b  
 Carbon dioxide in water of Gulf of Mexico: Wells, 18  
 Cementing of natural rocks: Hunt, 75g  
 Chalcocite enrichment: Spencer (A C), 13a  
 Chemical deposits of the sea: Vaughan, 17b  
 Chemical equivalence of crystalline and sedimentary rocks: Gilbert, 94b  
 Chemical work of U. S. Geological Survey: Clarke (F W), 09, 10b  
 Coastal Plain waters of Georgia, chemical character: Dole, 15  
 Colloidal gold and silver: Bastin, 15  
 Color in the Vernon shale, origin: Miller (W J), 10a  
 Composition of sea water: Clarke (F W), 11  
 Contact zones: Uglow, 13a  
 Copper: Hunt, 70e  
   precipitation by natural silicates: Sullivan, 05  
   secondary enrichment: Kemp, 05b  
   sulphide enrichment, reactions: Zies, 16  
 Copper-ore enrichment, chemistry of: Clark (J D), 14  
 Data of geochemistry: Clarke (F W), 08  
 Denudation, chemical: Clarke (F W), 10  
 Diarsenides as silver precipitants: Palmer (C), 17  
 Dolomitization: Wallace (R C), 14  
 Echinoderms, analyses: Clarke (F W), 17a  
 Electrochemical activity between solutions and ores: Wells (R C), 13  
 Examination of minerals: Bolton, 77  
 Feldspars, origin: Hunt, 58c  
 Fluorine in sericitization: Paige, 18  
 Fractional precipitation of ore-forming compounds: Wells, 15  
 General: Becker (G F), 86; Clarke (F W), 84, 86, 87, 89, 90, 90a, 91, 92, 93, 00; Crosby, 84c, 97; Hartzell, 13; Hunt, 59a, 62b, 68c, 71, 75, 86, 87c; Nishihara, 14; Robb, 62; Van Hise, 04; Wurtz, 70  
 Geochemical statistics: Clarke (F W), 12  
 Gold, deposition in nature: Lenher, 18  
 Greensand, analysis, methods: Hicks (W B), 17  
 Gypsums, formation: Hunt, 59c  
 Inorganic constituents of Alcyonaria: Clarke (F W), 15c; of Crustacea: Clarke (F W), 18  
 Interpretation of water analyses: Rogers (G S), 17d  
 Invertebrates, inorganic constituents: Clarke (F W), 17  
 Iron and manganese in sedimentary rocks: Penrose, 93a  
 Iron pyrites, decomposition: Julien, 86  
 Kentucky: Peter (R), 56, 57, 57a, 61, 76, 78, 80, 84, 85, 85a, 88  
 Lime and magnesia salts: Hunt, 66b

## Geochemistry—Continued.

- Limestone and dolomite, evolution: Steidtmann, 11  
 Lingulae, composition: Logan, 54a  
 Magnesian rocks, formation: Hunt, 59c  
 Magnesium carbonate, solubility in natural waters: Wells, 15a  
 Manganese and iron in sedimentary rocks: Penrose, 93a  
 Marcasite and wurtzite: Allen (E T), 14a  
 Melilite and gehlenite, constitution: Clarke (F W), 17b  
 Metallic elements, relative abundance: Clarke (F W), 14b  
 Metallic minerals as precipitants of silver and gold: Palmer (C), 13a  
 Metamorphic rocks: Hunt, 63b  
 Mineral analyses: Wright (F E), 13h; calculation and comparison: Van Orstrand, 14  
 Mineral analysis: Clarke (F W), 68  
 Mineral matter of sea: Salisbury, 05  
 Mineral separations by heavy solutions: Hillebrand, 13  
 Mineral sulphides of iron: Allen (E T), 11, 12a  
 Natural solutions of cinnabar, gold, and associated sulphides: Becker (G F), 87b  
 Natural waters: Hunt, 65b  
 Oil field waters: Rogers (G S), 16  
 Ore deposition: Jenney, 03a; with special reference to sulphides of iron: Allen (E T), 11  
 Organic deposits of the sea: Vaughan, 17b  
 Oxidation of manganese solutions: Lenher, 16  
 Oxidation of sulphides: Gottschalk, 12  
 Pennsylvania, analyses: McCreath, 75, 79, 81  
 Petroleum: Bacon, 16  
 Phase rule and igneous magmas: Day (A L), 05b; Read, 05  
 Potash, extraction from wyomingite: Wells, 16  
 Potash brine, evaporation: Hicks (W B), 15a  
 Precipitation of gold and silver: Palmer (C), 13  
 Primeval earth, chemical conditions: Hunt, 58b  
 Pyrite, vadose synthesis: Whitman, 13  
 Pyrite and marcasite: Allen (E T), 14; Julien, 02a; Stokes, 01  
 Red-colored rocks, paucity of organic remains, in: Newberry, 70  
 Rock analysis, methods: Hillebrand, 00b  
 Rocks, crystalline and sedimentary, chemical equivalence: Gilbert, 94b  
 Role of hydrolysis: Wells, 11  
 St. Lawrence and Ottawa rivers, composition of water: Hunt, 57f  
 Salinity of ocean-waters at Fowney Rocks, Fla.: Dole, 18  
 Sea water at Tortugas: Dole, 14a  
 Sericite a low temperature hydrothermal mineral: Rogers (A F), 16  
 Silica, forms and relations: Fenner, 12  
 Silica, in Bedford limestone: Knight (N), 05  
   solution of: Hayes, 97  
 Silicates, action of ammonium chloride: Clarke (F W), 02; action of silver nitrate on: Steiger, 05; constitution: Clarke (F W), 14a  
 Silicic acids: Becker (G F), 89a  
 Silicification of fossils: Hunt, 64b  
 Silver, enrichment: Cooke (H C), 13; Palmer (C), 14a; precipitation by covellite: Elley, 15



**Geochemistry—Continued.**

- Solubility of constituents of rocks: Smyth, 13  
 Sulphide enrichment: Emmons (W H), 13;  
 Grout, 13  
 Sulphides of zinc, cadmium and mercury: Allen  
 (E T), 12  
 Temperature measurements of geological  
 occurrences: Koenigsberger, 12  
 Transportation and deposition of gold in  
 nature: Lenher, 12  
 Uranium-vanadium ores, origin: Notestein, 18  
 Vanadium and chromium: Watson (T L), 12c  
 Volcanic gases: Sainte-Claire Deville, 67a  
 Water analyses, geochemical interpretation:  
 Palmer (C), 11

**Geodes.**

- Black Hills region: O'Harra, 10  
 Fluids in cavities of minerals: Brewster, 23  
 Formation: Bassler, 08  
 Illinois, Keokuk beds: Brush, 66a; Perkins  
 (G H), 71; Van Tuyl, 16f; Wallace (S J),  
 78; Wherry, 18c  
 Minerals in: Dana (J D), 45a  
 Origin: Van Tuyl, 12a, 14b, 16f  
 Geogenesis: Chamberlin (T C), 16, 17; Frazer, 05  
 Geogony, chemical: Wurtz, 70  
 Geographic distribution of animals and plants.  
 Climate and evolution: Matthew (W D), 11e  
 Corals, Dana (J D), 43b  
 Cricotus. Permo-Carboniferous: Case, 15d  
 Deer: Matthew (W D), 17d  
 Dinosauria: Lull, 10a  
 Echinodermata, Mesozoic and Cenozoic: Clark  
 (W B), 09b  
 Eocene flora, southeastern North America:  
 Berry, 14a  
 Eocene Mollusca: Maury, 12  
 General: Barbour (T), 16; Grabau, 09f; Heil-  
 prin, 87; Matthew (W D), 15b; Ortmann,  
 96a, 02; Scharff, 11  
 Glacial period, effects of: Scudder, 94a  
 Glacial period, plants: Transeau, 03  
 Index fossils: Grabau, 09f  
 Isthmus of Panama and animal life of North  
 and South America: Scott (W B), 16  
**Mammalia**: Matthew (W D), 15  
 Marine invertebrates: Smith (J P), 95a  
 Mastodon: Lyell, 43b  
 Migrations of faunas: Smith (J P), 95a, 04  
**Mollusca**: Dall, 16a  
 Pacific Coast Tertiary faunas: Arnold, 09b  
 Paleozoic: Hall, 43f, 44c  
 Panama ancient canals: Dickerson, 17c  
 Permian Reptilia: Case, 08d  
 Plants: Ward (L F), 89  
 Pleistocene Mammalia: Hay (O P), 09d, 12b  
 Polar climate: Wieland, 03a  
 Radiation, adaptive: Osborn, 02e  
 Tertiary faunas: Dall, 09a  
 Tertiary land connection between North and  
 South America: Scharff, 09  
 Triassic, lower: Smith (J P), 12  
 Unionidae, northeastern North America: Simp-  
 son (C T), 93  
 Geologic climate. *See* Paleoclimatology.  
 Geologic day: Lane, 06e

Geologic formations, nomenclature: Bain, 04h;  
 Keith, 09

Geologic formations, tables. *See also* Correlation.

Alabama: Hager, 18; Smith (E A), 88, 94b,  
 04, 07

Birmingham district: Burchard, 10c

Hatchetigbee anticline: Hopkins (O B), 17b

Alaska: Brooks, 07; Mendenhall, 00; Schrader,  
 00a

Alaska Peninsula: Atwood, 11

Circle quadrangle: Prindle, 13b

Controller Bay region: Martin (G C), 08

Fairbanks and Rampart quadrangles: Prin-  
 dle, 08

Fortymile quadrangle: Prindle, 09

Iliamna and Clark lakes region: Martin (G C),  
 10a

Iliamna region: Martin (G C), 12a

Mesozoic rocks: Moffit, 11a

Mount McKinley region: Brooks, 11

Paleozoic of upper Yukon: Brooks, 08a

Seward Peninsula: Collier, 08a

southeastern: Kindle, 07; Mesozoic: Chapin,  
 18a; Wright (F E), 08

Alaska-Yukon boundary: Cairnes, 14b

Alberta, northern: Slipper, 16

oil fields: Dowling, 15c

Rocky Mountains: Allan, 13

southern: Dowling, 17

southwestern: Stewart (J S), 16

Algonkian, Montana: Walcott, 06; Montana  
 and Idaho: Calkins, 09, 15

America: Marcou, 87a, 88

Antigua: Brown (A P), 14

Appalachian basin, Carboniferous: Stevenson,  
 06

Arizona, Grand Canyon, Shinumo area: Noble,  
 10, 14

Mazatzal Range: Ransome, 15a

Navajo country: Gregory (H E), 16a

northern: Darton, 10a

San Francisco field: Robinson, 13

Arkansas: Collier, 07b; Veatch (A C), 06e

Caddo Gap and De Queen quadrangles:  
 Miser, 17

northeastern: Stephenson, 16a

northern: Ulrich, 04

Ouachita area: Purdue, 09

slate area: Purdue, 10

Washington Co.: Branner, 91

Atlantic Coastal Plain: Clark (W B), 09a

British Columbia, Beaverdell area: Reinecke, 15

Boundary district: LeRoy, 12

Bridge River area: Drysdale, 16

coast region: Bancroft (J A), 13

Cordilleran formations: Daly (R A), 13a

Cranbrook area: Schofield, 15

Field area: Allan, 14

Flathead area: MacKenzie, 16a

Fraser River region: Malloch, 10

Golden-Kamloops: Daly (R A), 15

Graham Island: Mackenzie, 16b

Highland Valley copper camp: Drysdale, 16

Ice River district: Allan, 12a

interior plateau region: Drysdale, 13

Kamloops area: Dawson (G M), 95



## Geologic formations, tables—Continued.

- British Columbia, Kootenay region: Drysdale, 17a  
 Nanaimo area: Clapp (C H), 14  
 Rocky Mountains: Allan, 13  
 Skeena River district: Leach, 10  
 Telkwa River district: Dolmage, 17  
 Texada and Moresby Islands: McConnell, 10a  
 Tulameen district: Camsell, 10, 13  
 Vancouver area: Burwash, 18  
 Vancouver Island: Clapp (C H), 10, 12, 13b, e; Sooke and Duncan areas: Clapp, 17  
 California: Smith (J P), 10, 16  
 Coalinga district: Arnold, 09a, 10  
 Furnace Canyon: Keyes, 09f  
 Neocene: Anderson (F M), 11  
 San Francisco region: Lawson, 03a  
 San Joaquin Valley (western border): Anderson (R), 15  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria district: Arnold, 07f  
 Shasta Co.: Smith (J P), 94a  
 Shasta-Chico series: Diller, 94a  
 southern: Eldridge, 07  
 Summerland district: Arnold, 07e  
 Taylorsville region: Diller, 92, 08b; Hyatt, 92  
 Tertiary and Pleistocene: Arnold, 06  
 Cambrian: Walcott, 88, 89c, 00a  
 Cordillera: Burling, 14  
 Virginia: Bassler, 07  
 Canada: Logan, 63  
 middle: Dowling, 09  
 pre-Cambrian: Adams (F D), 08a  
 Rocky Mountain region: Dawson (G M), 01  
 western, Cretaceous: Dawson (G M), 89b  
 Carboniferous: Keyes, 09m, 14e; Smith (J P), 94, 03  
 Appalachian basin: Stevenson, 06  
 Kansas: Schrader, 08  
 Kenova quadrangle: Phalen, 08a  
 Kentucky-Illinois fluorite district: Morse, 10  
 Pennsylvania: Butts, 06a  
 United States and New Mexico: Keyes, 06, 06a  
 Carboniferous and Permian of America, Russia, and India: Schuchert: 06b  
 Chattanooga series: Ulrich, 12  
 Chester series: Ulrich, 17  
 Cincinnati group: Cumings, 08  
 Cincinnati region: Fenneman, 16; Foerste, 05b, 09c, 12b  
 Cincinnati series: Nickles, 03  
 Coastal Plain: Clark (W B), 16  
 Colorado: Underhill (J), 05, 10; Darton, 06f; Ziegler, 18b  
 Breckenridge district: Ransome, 11  
 Castle Rock quadrangle: Richardson (G B), 15  
 Durango-Gallup field: Shaler (M K), 07b  
 eastern: Butler (G M), 15  
 Grand Mesa coal field: Lee (W T), 09  
 Grand Mesa and West Elk Mountains fields: Lee (W T), 12a  
 Grand River and White River regions: Gale, 07a  
 north central: Henderson (J), 09  
 North Park: Beekly, 15

## Geologic formations, tables—Continued.

- Colorado: Rangely district: Gale, 08b  
 Raton Mesa region: Lee (W T), 17  
 Rocky Mountains correlated with Plateau belt: Cross, 07  
 Trinidad coal field: Richardson (G B), 10  
 Yampa field: Fenneman, 06b  
 Cordillera, forty-ninth parallel: Daly, (R A), 13  
 Correlation, Ordovician and Silurian: Bassler (R S), 15a  
 Paleozoic: Ulrich, 11a  
 Tertiary: Vaughan, 18d  
 Cretaceous: Carstarphen, 11; Dawson (G M), 81a  
 Atlantic coast: Clark (W B), 04b, 07, 00a, 16c  
 New York and New England: Hollick, 06  
 Delaware: Chester (F D), 84, 84a; Miller (B L), 06  
 Devonian, Allegheny region: Kindle, 12  
 Appalachian region: Swartz, 13  
 New York: Luther, 06, 06a; Williams (H S), 06  
 Eopaleozoic: Bassler, 11  
 Florida: Cooke (C W), 15; Mansfield (G R), 17; Matson, 09a, b, 13a, 15; Sellards, 08a; Vaughan, 10c  
 General: Eaton (A), 41; Grabau, 09f; Howell (E E), 79; Schuchert, 10  
 Georgia: Veatch (J O), 09  
 Appalachian Valley: Shearer, 18a  
 Appalachian Valley and Cumberland Plateau: Maynard, 12  
 Coastal Plain: Shearer, 17; Stephenson, 15a; Veatch (J O), 11a  
 Glacial: Upham, 91e  
 Great Basin: Ball (S H), 07  
 Gulf Coastal Plain: Matson, 16, 16a  
 Idaho, Fort Hall Indian Reservation: Mansfield (G R), 16b  
 Montpelier district: Gale, 10a  
 phosphate reserve: Richards, 11b  
 pre-Cambrian: Ransome, 08  
 southeastern: Gale, 10b; Mansfield, 16; Richards (R W), 14a; Schultz, 18  
 Illinois, Alexander Co., Ordovician and Silurian: Savage, 09  
 Cap au Grès: Keyes 98n  
 Jo Daviess Co., Elizabeth sheet: Cox (G H), 10  
 northwestern: Carman, 09; Cox (G H), 14  
 Paleozoic, southwestern: Savage, 08  
 southern, pre-Devonian: Savage, 10a  
 Indiana: Hopkins (T C), 04a; northern: Capps, 10b  
 Iowa: Keyes, 12e, 14b, d, 15c, n; Norton, 12  
 Black Hawk Co.: Arey, 06  
 Bremer Co.: Norton, 06  
 Butler Co.: Arey, 10  
 Clayton Co.: Leonard, 06  
 Davis Co.: Arey, 10c  
 eastern: Carman, 09  
 Franklin Co.: Williams (I A), 06  
 Hamilton Co.: MacBride, 10  
 Harrison and Monona cos.: Shimek, 10  
 Iowa Co.: Stookey, 10  
 Jackson Co.: Savage, 06a  
 Lancaster quadrangle: Grant (U S), 07  
 Poweshiek Co.: Stookey, 10a



**Geologic formations, tables—Continued.**

- Iowa: Sac and Ida cos.: MacBride, 06  
 Waukon area: Howell (J V), 16  
 Wayne Co.: Arey, 10b  
 Winneshiek Co.: Calvin, 06  
 Wright Co.: MacBride, 10  
 Kansas: Keyes, 15b, 0; Moore (R C), 17  
 Carboniferous: Beede, 09a; Haworth, 08b;  
 Schrader, 08;  
 central, Carboniferous: Prosser, 95a  
 Green Co.: Haworth, 08d  
 Independence quadrangle: Schrader, 05, 06a  
 Kentucky: Foerste, 05, 06; Miller (A M), 17  
 Blue Grass region: Matson, 09  
 central: Fohs, 13  
 Dix River region: Foerste, 12  
 Franklin Co.: Miller (A M), 14  
 Georgetown quadrangle: Miller (A M), 13a  
 Jefferson Co.: Butts, 15  
 western: Fohs, 07  
 Labrador, northeastern: Coleman, 17c  
 Lake Superior region: Brooks, 76a; Keyes, 14f;  
 Leith, 05a; Winchell (N H), 95p  
 Louisiana: Fenneman, 06a; Matson, 17; Veatch,  
 (A C) 06e  
 Austin quadrangle: Harris, 09b  
 Caddo field: Harris, 09b, 10; Hopper, 11;  
 Matson, 16b  
 salt region: Harris, 09  
 Maine, southwestern: Katz, 17a  
 Manitoba: Kindle, 14a  
 Churchill River region: Alcock, 16  
 Pembina Mountain: MacLean, 16  
 Maryland: Clark (W B), 06, 09c; Md G S, 12  
 Calvert Co.: Shattuck, 07  
 Coastal Plain: Clark (W B), 11; Mathews, 09  
 Devonian: Swartz, 13  
 Dover quadrangle: Miller (B L), 06  
 Patuxent quadrangle: Shattuck, 07c  
 Pawpaw and Hancock quadrangles: Stose,  
 12b  
 Prince Georges Co.: Miller (B L), 11  
 St. Marys Co.: Shattuck, 07a  
 St. Marys quadrangle: Shattuck, 06a  
 Tolchester quadrangle: Miller (B L), 17  
 Massachusetts: Emerson (B K), 17  
 Mesozoic: Clark (W B), 15  
 New Mexico: Keyes, 06e  
 Oregon and California: Diller, 08  
 Mexico, Coahuila, coal-bearing strata: Aguilera,  
 09c  
 northeastern: Garfias, 15  
 Michigan: Cook (C W), 14; Lane, 09a; Smith  
 (R A), 14, 16  
 Ann Arbor quadrangle: Russell (I C), 08  
 Arenac Co.: Gregory (W M), 12  
 Gogebic range: Allen (R C), 15a  
 Gwinn iron district: Allen (R C), 14d  
 Huronian: Lane, 10a  
 Iron River district: Allen (R C), 10  
 Little Lake district: Allen (R C), 14  
 Monroe formation: Grabau, 10  
 pre-Ordovician: Lane, 07, 09  
 Minnesota: Winchell (H V), 98; northeastern:  
 Winchell (A N), 00  
 Mississippi: Brown (C S), 07; Crider, 06, 06b,  
 Logan, 05a, 07

**Geologic formations, tables—Continued.**

- Mississippi Valley, Ordovician: Sardeson, 07;  
 upper: Bain, 06  
 Mississippian: Bassler, 11d; Weller (S), 14  
 Missouri: Crane (W M), 12; Dake, 18; Keyes,  
 14e, 15o; Shepard, 04a, 07; Winslow, 95  
 Camden Co.: Scherer, 05  
 Greene Co.: Shepard, 15  
 Morgan Co.: Marbut, 08  
 northeastern: Greene (F C), 14  
 Ozark region: Haworth, 04, 08d  
 southeastern: Buckley, 09  
 southwestern: Buckley, 08  
 Montana: Rowe, 06  
 Algonkian: Walcott, 06a  
 Baker field, Custer Co.: Bowen (C F), 12  
 Bearpaw Mountains region: Pepperberg, 10  
 Big Horn Mountains: Darton, 06e  
 Big Sandy field: Bowen (C F), 14b  
 Birch Creek-Sun River region: Stebinger, 18  
 Blackfeet Indian Reservation: Stebinger, 17a  
 Bowdoin dome: Collier, 17  
 Bull Mountain coal field: Lupton, 11; Woolsey, 17  
 Cleveland field: Bowen (C F), 14a  
 Culbertson field, Valley Co.: Beekly, 12  
 Custer Co.: Terry lignite field: Herald, 12  
 Dawson Co., Glendive field: Hance, 12  
 eastern: Calvert, 12; Rowe, 16  
 Great Falls region: Fisher (C A), 09, 09a  
 Livingston and Trail Creek fields: Calvert,  
 12a  
 Milk River field: Pepperberg, 12  
 north-central: Stebinger, 16a  
 northeastern: Collier, 18a  
 Philipsburg quadrangle: Emmons (W H), 13b  
 Sidney field, Dawson Co.: Stebinger, 12  
 Narragansett Basin: Loughlin, 14b  
 Navajo country: Gregory (H E), 17  
 Nebraska: Condra, 08a  
 Nevada, Eureka district: Emmons (W H), 10;  
 Tonopah district: Burgess, 09  
 New Brunswick, Cambrian: Matthew (G F),  
 16; southern: Bailey, 65  
 New England, Cretaceous: Hollick, 06  
 Newfoundland, Cambrian and Ordovician: Van  
 Ingen, 14a  
 New Hampshire, southeastern: Katz, 17a  
 New Jersey: Kummel, 09  
 Cretaceous: Weller, (S) 07  
 Philadelphia district: Bascom, 09a  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Keyes, 04b, 06a, b, c, 15, 15a, o  
 Carboniferous: Gordon (C H), 07a  
 coal fields: Lee (W T), 12b  
 Durango-Gallup field: Shaler (M K), 07b  
 Gallina-Raton Spring coal field: Gardner  
 (J H), 09  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Navajo country: Gregory (H E), 16a  
 northwestern: Darton, 10a  
 Puerco region: Gardner (J H), 10e  
 Raton field: Lee (W T), 09a  
 Raton Mesa region: Lee (W T), 17  
 Rio Grande region: Keyes, 09m; Lee (W T),  
 09b; Lindgren, 10



## Geologic formations, tables—Continued.

- New Mexico: San Juan Co.: Bauer, 16  
Sierra and Socorro cos.: Lindgren, 10  
Tertiary: Keyes, 07d  
New York: Bigsby, 58; Clarke (J M), 03g; Merrill (F J H), 02b; Miller (W J), 14  
Attica-Depew quadrangles: Luther, 14  
Auburn-Genoa quadrangles: Luther, 10  
Buffalo quadrangle: Luther, 06  
Cambrian and Ordovician: Cushing, 11  
Canandaigua and Naples quadrangles: Clarke (J M), 04 b  
Cretaceous: Hollick, 06  
Devonian: Eastman, 07b; Grabau, 06; Luther, 06a  
Erie Co.: Houghton (F), 14  
Geneva-Ovid quadrangles: Luther, 09  
Ithaca section: Williams (H S), 06  
Niagara quadrangle: Kindle, 13c  
Niagara region: Kindle, 14f  
Niagaran deposits: Ulrich, 11a  
Ordovician: Cushing, 08  
Poughkeepsie quadrangle: Gordon (C E), 11  
Rochester and Ontario Beach quadrangles: Hartnagel, 07b  
Saratoga Springs region: Cushing, 14  
Silurian: Grabau, 06  
Skunnemunk Mountain region: Hartnagel, 07a  
Syracuse quadrangle: Hopkins (T C), 14  
upper Devonian: Clarke (J M), 08c  
Watkins Glen-Catatonk district: Williams (H S), 09  
New York series: Chadwick, 08  
Niagaran of west Tennessee: Pate, 08  
North America: Eaton (A), 28a; Schuchert, 14a  
North America and Europe: Cope, 79  
North Carolina, Nantahala quadrangle: Keith, 07  
North Dakota: Leonard, 06d, 17; Cannonball River lignite field: Lloyd, 14  
Nova Scotia, Arisaig area: Twenhofel, 13; Arisaig-Antigonish district: Williams (M Y), 14  
Ohio: Prosser, 03, 05  
Cleveland gas field: Rogers (G S), 17b  
Columbus quadrangle: Stauffer, 11a  
Devonian: Stauffer, 07, 08, 09  
Muskingum Co.: Stout, 18  
northeastern: Prosser, 12a  
Silurian: Stauffer, 08  
southern: Stout, 16  
Steubenville quadrangle: Griswold, 07a  
western, Niagaran: Prosser, 16  
Wooster area: Bonine, 15  
Oklahoma: Wallis, 15  
Arbuckle Mountains: Reeds, 11  
Carboniferous: Beede, 09a  
northeastern, Pennsylvanian rocks: Ohern, 10.  
southern: Hutchison, 11  
Ontario, Cobalt district: Hore, 10  
Devonian: Stauffer, 15  
Espanola district: Quirke, 17  
Gowganda area: Collins (W H), 13  
Haliburton-Bancroft area, pre-Cambrian: Adams (F D), 13b

## Geologic formations, tables—Continued.

- Ontario, Hamilton area: Parks, 13c  
Kingston area: Baker (M B), 16; Kindle, 16  
Lake Huron region: Collins (W H), 16a  
Manitoulin Island: Williams (M Y), 14a  
Michipicoten region: Coleman, 06  
Nipigon Basin: Wilson (A W G), 10  
Nipissing district: Hore, 10a, c  
Onaman iron range: More (E S), 09b  
Onaping area: Collins, 14, 17  
Pleistocene: Coleman, 09c  
pre-Cambrian: Miller (W G), 07a; Moore (E S), 12b  
Rainy Lake: Lawson, 13d  
southwestern: Stauffer, 14; Williams (M Y), 14c  
Sudbury district: Coleman, 05  
Thousand Islands region: Cushing, 10a  
Toronto region: Coleman, 13j  
Ordovician: Grabau, 12e; Nickles, 05  
Canada: Mather, 17c  
Cincinnati region: Bassler, 06; Foerste, 09d, 10, 12a  
Kentucky: Foerste, 13d; Miller (A M), 15  
Silurian, and Devonian: Grabau, 09a  
upper Mississippi Valley: Sardeson, 07  
Virginia: Bassler, 07  
Oregon, Tertiary, John Day region: Merriam, 07  
Orogenic epochs: Blackwelder, 14  
Ozark region: Adams (G I), 01; Keyes, 98m  
Ozark series, Missouri: Bain, 05e  
Paleozoic: Ulrich, 02, 11a; Winchell (A), 69b; lower: Grabau, 09a  
Panama, Tertiary: Vaughn, 18c  
Pennsylvania, Burgettstown and Claysville quadrangles: Griswold, 07a  
Carboniferous: Butts, 06a  
Chester Co., Doe Run-Avondale region: Bliss (E F), 16  
Coatesville quadrangle: Bliss (E F), 14  
Lehigh region: Miller (B L), 11b  
Pawpaw and Hancock quadrangles: Stose, 12b  
Philadelphia district: Bascom, 09a  
Shenandoah group: Stose, 08  
Trenton quadrangle: Bascom, 09b  
Phosphate area, Idaho, Wyoming, and Utah: Gale, 10b  
Phosphate formations, Rocky Mountain region: Adams (F D), 15a  
Pleistocene, Rhode Island and Massachusetts: Shaler, 96; northeastern New England: Clapp (F G), 08  
Pre-Cambrian: Adams (F D), 09b, 15; Coleman, 14a; Collins (W H), 14b; Credner, 68; Keyes, 17i; Lane, 08, 17; Lawson, 16; Schofield, 14b; Van Hise, 08, 09a  
Canada: Miller (W G), 14; Moore (E S), 12b  
Idaho: Ransome, 08f  
Lake Superior region: Lawson, 13c; Leith, 15b; Van Hise, 91  
Ontario: Miller (W G), 15a  
Pre-Silurian formations: Winchell (N H), 93d  
Quaternary: McGee, 88a; California: Arnold, 06  
Quebec, Bell River region: Wilson (M E), 14  
Chibougamau region: Barlow, 11a



## Geologic formations, tables—Continued.

- Quebec, Coleraine area: Knox, 18  
 Grenville district: Wilson (M E), 17a  
 Kewagama Lake area: Wilson (M E), 13c  
 Lake St. John district: Dresser, 16  
 Pre-Cambrian: Adams (F D), 10d  
 southern: Dresser, 10b, 12  
 Thetford-Black Lake district (Coleraine sheet): Knox, 17  
 Three Rivers sheet: Ells, 00  
 Rhode Island: Emerson (B K), 07  
 Rocky Mountain region: Storrs, 02  
 Saskatchewan, Lac LaRonge district: McInnes, 10  
 Silurian: Grabau, 12e; New York: Luther, 06  
 South Carolina: Sloan, 04, 07, 08  
 South Dakota: Perisho, 12; Todd, 95  
 Black Hills region: Darton, 09, 09a, 18; Jaggar, 01; O'Harra, 08, 10  
 northwestern: Winchester, 16  
 Tennessee: Ashley, 10b; Safford, 01  
 eastern: Jarvis, 12; Stose, 18; Paleozoic: Gordon (C H), 11b  
 Perry Co.: Wade (B), 14  
 phosphate region: Mansfield (G R), 17  
 Pikeville quadrangle: Phalen, 11  
 Niagaran: Pate, 08  
 Valley, central part: Gordon (C H), 12a  
 Waynesboro quadrangle: Drake, 14  
 western: Dunbar, 18  
 Tertiary: Dall, 98; Douglass, 07; Merriam, 15b; Osborn, 10, 10a; Scott, 93  
 Atlantic Coastal Plain: Clark (W B), 09a  
 California: Arnold, 06  
 California, Oregon, and Washington: Arnold, 09b  
 North Pacific coast: Arnold, 13  
 southeastern United States: Vaughn, 18c  
 Texas: Dumble, 90; Fenneman, 06a; Ries, 06a  
 central mineral region: Comstock, 91  
 Chisos country: Udden, 07a  
 Coastal Plain: Deussen, 14  
 Cretaceous: Hill (R T), 94  
 Hemphill Co.: Eyerly, 07  
 Lasalle and McMullen cos.: Deussen, 16  
 Llano and Burnet quadrangles: Paige, 12  
 Marathon Basin: Baker (C L), 17  
 northeastern: Burchard, 15; Gordon (C H), 11  
 northern: Hill (R T), 87a  
 oil regions: Hill (R T), 02b  
 Paleozoic, El Paso and Van Horn quadrangles: Richardson (G B), 08  
 Palestine salt dome: Hopkins (O B), 17  
 Panhandle: Gould, 06, 07  
 southwestern: Dumble, 03  
 Triassic: Eastman, 11; Martin (G C), 16; Merriam (J C), 08; Wherry, 12e; Alaska: Martin (G C), 16  
 United States: Maclure, 09  
 Upper Cretaceous: Clark (W B), 16a  
 Utah, Castle Valley: Lupton, 16a  
 Iron Springs district and Colob Plateau: Leith, 08a  
 northern: Gale, 10b  
 San Juan oil field: Woodruff, 12  
 southern, coal region: Richardson (G B), 09a  
 Uinta Basin: Eldridge, 96

## Geologic formations, tables—Continued.

- Utah, Uinta Range: Weeks, 07 Wasatch Co., Blacktail Mountain coal field: Lupton, 12a  
 Wasatch Mountains: Blackwelder, 10a  
 Virginia: Rogers (W B), 80; Watson, 11, 11d  
 Cambrian and Ordovician: Bassler, 07  
 Coastal Plain: Clark (W B), 06d, 12b  
 middle western: Watson, 13c  
 Richmond area: Shaler, 99a  
 western: Bassler, 08a; Cambrian and Ordovician: Bassler, 09  
 Washington, Oligocene: Van Winkel, 18  
 West Virginia: Grimsley, 06; Rogers (W B), 80  
 Panhandle: Grimsley, 07  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Steubenville quadrangle: Griswold, 07a  
 Wisconsin: Hotchkiss, 12; Mead (D W), 94a; Weidman, 15  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
 north central: Weidman, 07a  
 Wyoming: Darton, 08; Knight (W C), 01c  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Wyoming, Big Horn Basin: Fisher (C A), 06; Hewett, 17; Lupton, 16; Washburne, 08, 09; Woodruff, 10  
 Big Horn Co.: Hintze, 15  
 Big Horn Mountains: Darton, 06b, e  
 Big Muddy dome: Barnett, 14b  
 Black Hills region: Darton, 09  
 Byron field: Ziegler, 17  
 Carbon Co.: Veatch (A C), 07a  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Cretaceous and Tertiary: Veatch (A C), 07  
 Douglas oil field, Converse Co.: Barnett, 14; Jamison, 12  
 Fremont Co.: Jamison, 11a; Copper Mountain district: Trumbull, 16a  
 Great Divide Basin coal field: Smith (E E), 09  
 Hay Creek coal field: Jenney, 99  
 Lander oil field: Woodruff, 11  
 Laramie Basin: Darton, 09f  
 Lincoln Co.: Schultz, 14  
 Little Snake River coal field: Ball (M W), 09, 10  
 Moorcroft field: Barnett, 14a  
 Muddy Creek oil field, Carbon Co.: Jamison, 12  
 Oregon Basin field: Ziegler, 17a  
 Park Co.: Moody, 18  
 Powder River field: Wegemann, 12  
 Salt Creek oil field: Wegemann, 11, 18  
 Shoshone River section: Hewett, 14b  
 Sweetwater Co.: Schultz, 09, 10  
 Uinta Co.: Schultz, 07b, 08  
 western: Gale, 10b; Schultz, 18  
 Wind River basin: Woodruff, 12c; Ziegler, 16  
 Yukon, Klotassin area: Cairnes, 17a  
 Lewes and Nordenskiöld rivers district: Cairnes, 10a  
 Wheaton district: Cairnes, 10, 11a, 16



Geologic history. *See also* Paleoclimatology; Paleogeography.

Acadia: Matthew (G F), 93e  
 Acadian trough: Bailey (L W), 97  
 Alabama, Birmingham quadrangle: Butts, 10a  
 Gadsden quadrangle: Hayes, 96  
 Alaska: Brooks, 07, 11a; Paige, 07b; Spencer (A C), 06a  
 Alaska Peninsula: Atwood, 11  
 Anvik-Andreafski region: Harrington (G L), 18  
 Broad Pass region: Moffit, 15  
 central, Quaternary history: Eakin, 17b  
 Chisana-White River district: Capps, 16  
 Chitina Valley: Moffit, 18  
 Circle quadrangle: Prindle, 13b  
 Controller Bay region: Martin (G C), 08  
 Copper River district: Schrader, 01; Mendenhall, 05  
 Cosna-Nowitna region: Eakin, 18  
 Ellamer district: Capps, 15a  
 Fairbanks quadrangle: Prindle, 13  
 Fortymile quadrangle: Prindle, 09  
 Gulkana-Susitna region: Moffit, 12  
 Hanagita-Bremner region: Moffit, 14  
 Iditarod-Ruby region: Eakin, 14  
 Iliamna region: Martin (G C), 12a  
 Kenai Peninsula: Martin (G C), 15  
 Ketchikan district: Brooks, 02a; Wright (C W), 15  
 Koyukuk-Kobuk region: Smith (P S), 11b, d  
 Mt. McKinley region: Brooks, 08c  
 Nabesna-White River district: Moffit, 10a  
 Nelchina-Susitna region: Chapin, 18  
 Nizina district: Moffit, 11a  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome and Grand Central quadrangles: Moffit, 13  
 Norton Bay-Nulato region: Smith (P S), 11c  
 Nulato-Council region: Smith (P S), 10a  
 Rampart quadrangle: Eakin, 13  
 Seward Peninsula: Collier, 02; Smith (P S), 10; southeastern: Smith (P S), 11c  
 southeastern: Brooks (A H), 02a; Wright (F E), 08  
 southwestern: Spurr, 00  
 Triassic: Martin (G C), 16  
 Turnagain Arm region: Moffit, 06  
 Yukon region: Brooks (A H), 08a; Spurr, 98a  
 Yukon-Koyukuk region: Eakin, 16  
 Alberta, Jasper Park: Dowling, 11a  
 Lake Minnewanka section: Shimer, 11  
 Alexandrian epoch, Mississippi Valley: Savage, 16a  
 American continent: Hall, 83m  
 Antillean region: Spencer (J W), 94  
 Antilles: Falconer, 02  
 Appalachian basin, Carboniferous: Stevenson, 06  
 Appalachian region: Barrel, 14; Claypole, 87a; Hitchcock (C H), 76b; Walcott, 93b; Willis, 92  
 Appalachians, northern, post-Jurassic: Barrel, 13c; southern: Safford, 59  
 Archean: Dana (J D), 92  
 Arctic regions: Meyer (O E), 11

Geologic history—Continued.

Arizona: Lee (W T), 08a  
 Bisbee quadrangle: Ransome, 04b  
 Bradshaw Mountains quadrangle: Jaggar, 05  
 Bright Angel quadrangle: Noble, 18  
 Buckskin Mountains: Blanchard, 13  
 Clifton-Morenci district: Lindgren, 05a  
 Colorado River region: Lee (W T), 06a, 07e  
 Globe quadrangle: Ransome, 02a, 04a  
 Grand Canyon district: Cadell, 87; Darton, 17b; Dutton, 82a; Noble, 14; Robinson (H H), 10  
 Jerome district: Provot, 16  
 San Franciscan field: Robinson (H H), 13  
 Santa Rita and Patagonia Mountains: Schrader, 15  
 Shinumo area: Noble, 10  
 Sulphur Spring Valley: Meinzer, 13  
 Tertiary peneplain: Robinson (H H), 07  
 Warren district: Bonillas, 16  
 Yuma Co.: Bancroft (H), 11  
 Arkansas: Ashley, 97; Purdue, 07b; Veatch (A C), 06e  
 chalk region: Taff, 02b  
 Crowley's Ridge: Call, 91  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 northeastern: Stephenson, 16a  
 Ouachita Mountains: Purdue, 09  
 southwestern: Hill (R T), 88  
 Atlantic Coastal Plain: Shaler, 71  
 Atlantic shore line: Harris (H L), 94  
 Atlantic slope: McGee, 88a; Cenozoic: Darton, 94g  
 Barbados: Harrison (J B), 90  
 Bay of Fundy trough: Bailey, 97; Powers, 15e  
 Bermudas: Stevenson, 97  
 Black Hills: Jenney, 99  
 Blue Ridge: Keith, 92a  
 British Columbia: Dawson (G M), 81b  
 Beaverdell area: Reinecke, 15  
 Cascade Mountains: Daly, 06a  
 coast region: Clapp (C H), 15a  
 Cranbrook area: Schofield, 15  
 Field area: Allan, 14  
 Franklin mining camp, West Kootenay: Drysdale, 15  
 Fraser delta: Camsell, 13a  
 Golden-Kamloops: Daly (R A), 15  
 Groundhog coal field: Malloch, 14  
 Hedley district: Camsell, 10a  
 interior plateau region: Drysdale, 13  
 Nanaimo area: Clapp (C H), 14  
 Rossland: Bruce, 17a; Drysdale, 15a  
 Selkirk Mountains: Burwash, 11  
 southwestern: Tyrrell, 15a  
 Texada Island: McConnell, 14  
 Thompson River valley: Drysdale, 14  
 Tulameen district: Camsell, 13  
 Vancouver Island: Clapp (C H), 13e  
 Ymir area, West Kootenay district: Drysdale, 17  
 California: Comstock, 02a; Diller, 06; Forstner, 09a; Lawson, 08; Smith (J P), 09, 10, 16  
 ancient river channels: Kimble, 07a  
 Berkeley Hills: Lawson, 02  
 Berkeley region: Clark (C W), 17  
 Cahuilla Basin: Free, 14a



## Geologic history—Continued.

California: Carmelo Bay: Lawson, 93d  
 Coalinga district: Arnold, 10  
 coast islands: Le Conte, 87  
 Coast Ranges: Osmont, 05; Willis, 00a; southern: Fairbanks, 98  
 Cuyama Valley: English, 16  
 Eagle Mountains: Harder, 12  
 gold belt: Turner, 94  
 Grass Valley district: Lindgren, 96b  
 Great Basin: Ball (S H), 06  
 Great Valley: Ransome, 96a  
 Klamath Mountains: Hershey, 03a  
 Lake Mono region: Le Conte, 79  
 Lassen Peak area: Diller, 95, 16b  
 Marysville Buttes: Dickerson, 17e  
 Miocene: Cooper (J G), 74b  
 Mohave desert region: Baker (C L), 11  
 Mother Lode district: Ransome, 00  
 Nevada City district: Lindgren, 96, 96b  
 northern coast: Lawson, 94  
 Owens Valley: Lee (W T), 06  
 Pliocene history: Cooper (J G), 74a  
 Point Reyes Peninsula: Anderson (F M), 99  
 Pyramid Peak quadrangle: Lindgren, 96a  
 San Clemente Island: Smith (W S T), 98  
 San Diego Co.: Mendenhall, 10  
 San Francisco district: Lawson, 14  
 San Francisco Peninsula: Ashley, 95  
 San Luis quadrangle: Fairbanks, 04  
 Santa Ana Mountains: Dickerson, 14b  
 Santa Catalina Island: Smith (W S T), 97  
 Santa Clara Valley: Crandall (R), 07  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria district: Arnold, 07q  
 Sierra Nevada: Le Conte, 80; Lindgren, 93, 96c, 11; Turner, 94c  
 southern: Baker (C L), 12; Le Conte, 99; Loew, 76; Tertiary: Louderback, 13  
 southern coast: Lawson, 93e  
 southern islands: Smith (W S T), 00  
 Taylorsville region: Diller, 08b  
 Tejon group: Dickerson, 16  
 Temblor Basin: Anderson (F M), 14  
 Tertiary: Anderson (F M), 08  
 Weaverville quadrangle: Diller, 14  
 Yolo Co., Cache Creek area: Durst, 16  
 Cambrian: Walcott, 15  
 Canada: Coleman, 10b; Parks (W A), 12a; Young (G A), 09  
 eastern: Bailey, 89a; Poole, 05  
 Gulf of St. Lawrence: Clarke (J M), 13a  
 northeastern: Low, 06  
 Canadian shield: Coleman, 10b  
 Cape Breton Island: Matthew (G F), 14  
 Carboniferous: Winchell (A), 59; Appalachian basin: Stevenson, 06; Coal Measures: Stevenson, 73  
 Caribbean area: Gregory (J W), 95  
 Cascade Mountains: Lang, 88; Smith (G O), 03; Symons, 82; Willis, 88a, 96  
 Central America: Vaughan, 18c  
 Chazy time: Raymond (P E), 06  
 Circles of deposition: Newberry, 74c  
 Classification: Chamberlin (T C), 98  
 Colorado: Darton, 06f; Denton, 67; Fisher (C A), 06a

## Geologic history—Continued.

Colorado: Apishapa quadrangle: Stose, 12  
 Boulder district: Fenneman, 05b  
 Breckenridge district: Ransome, 11  
 Castle Rock quadrangle: Richardson (G B), 15  
 Central City quadrangle: Bastin, 17  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Costilla Co., Grayback district: Patton, 10a  
 Cripple Creek region: Lakes, 95a  
 Denver region: Cannon, 95b; Eldridge, 89, 90; Emmons (S F), 96  
 Elk Mountains: Emmons (S F), 94  
 Elmore quadrangle: Hills, 99  
 Engineer Mountain quadrangle: Cross, 10  
 Florissant basin: Henderson (J), 06  
 Georgetown quadrangle: Ball (S H), 08  
 Gilpin Co.: Alsdorf, 16  
 Gold Brick district: Crawford (R D), 16  
 La Plata quadrangle: Cross, 99a  
 Monarch district: Crawford (R D), 10, 13  
 Needle Mountains quadrangle: Cross, 05b  
 north central: Henderson (J) 09  
 northwestern: Henderson (J), 10  
 Ouray quadrangle: Cross, 07a  
 Palmer Lake: Cannon, 95a  
 Perry Park: Kruger, 10  
 Pueblo quadrangle: Gilbert, 97  
 Raton Mesa region: Lee (W T), 17  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain National Park: Lee (W T), 17a  
 Rocky Mountains: Hills, 91c  
 Silverton quadrangle: Cross, 05  
 southwestern: Atwood, 15  
 Telluride quadrangle: Cross, 99  
 Tomichi district: Crawford (R D), 13  
 volcanic eruptions: Hills, 95a  
 Colorado Canyon: Davis (W M), 06c  
 Columbia River: Symons, 82  
 Connecticut: Dale, 11a; Kummel, 93; Lull, 12b; Rice (W N), 06  
 central: Barrell, 12  
 Housatonic region: Crosby, 00b  
 New Haven region: Dana (J D), 71  
 Triassic area: Davis (W M), 94  
 Continental history: Willis, 06  
 Coral reefs: Vaughan, 15b  
 Cordilleran Mesozoic revolution: Lawson, 93c  
 Cordilleras: Lindgren, 15a; Ransome, 15; Canada: Schofield, 13; forty-ninth parallel: Daly (R A), 13  
 Costa Rica: Romanes, 12; Talamanca region: MacDonald (D F), 14; Miller (B L), 14  
 Cretaceous, Arkansas-Texas: Hill (R T), 89d; South Carolina: Berry, 14  
 Critical periods: Le Conte, 77  
 Cuba: Hill (R T), 94a, 95b; Spencer (J W), 95a; Valdés Ragués, 97; Oriente Province, Firmeza district: Roesler, 16  
 Cycles of deposition: Hunt, 74n; Newberry, 74c  
 Cycles of sedimentation: Williams (J L), 91  
 Dakota sand: Huntley, 15a  
 Dalles of the St. Croix: Berkey, 98



## Geologic history—Continued.

- Delaware: Miller (B L), 06  
Delta deposits: Barrell, 12a  
Devonian: Clarke (J M), 08  
Devonic history of New York and eastern North America: Clarke (J M), 08b  
District of Columbia: Darton, 96j, 01; McGee, 98  
Eastern United States: Hollick, 93  
Florida: Cox, 96; Matson, 09b, 13a; Smith (E A), 81a; Vaughan, 10b, c, 14c  
east coast: Sellards, 16a, b  
southern: Sellards, 15  
Tallahassee region: Sellards, 17a  
western: Sellards, 18a  
Florida reef traet: Vaughan, 14a  
General: Dana (J D), 56a, b, 63c; Dawson (J W), 74; Hunt, 61a; Keyes, 14d; Le Conte, 95; Schuchert, 14b; White (C A), 86b  
Georgia, Appalachian Valley: Shearer, 18a  
Ellijay quadrangle: LaForge, 13  
Rome quadrangle: Hayes, 02  
Silurian: McCallie, 08a  
Geosyncline, western interior: Van Tuyl, 17  
Glacial: Fairchild, 13  
Glacial ice sheet: Upham, 11a  
Grand Canyon of the Colorado: Darton, 17b; Davis (W M), 01  
Great Basin: Ball (S H), 07  
Great Lakes: Emery (R), —; Goldthwait, 07; Newberry, 89e; Spencer (J W), 95c; Taylor (F B), 97, 07, 13, 13a; Upham, 05d  
Great Plains region: Keyes, 15p  
Greenland: Bøggild, 17; Julianehaab region: Ussing, 11  
Guatemala, Alta Vera Paz: Sapper, 01a  
Gulf of Mexico: Hilgard, 71a  
Hawaii: Jaggard, 13  
Hudson and Champlain valleys: Peet, 04  
Hudson Bay region (east coast): Leith, 10a  
Hudson Valley: Davis (W M), 92  
Idaho: Umpleby, 12a  
Boise region: Lindgren, 98, 98a  
Coeur d'Alene district: Ransome, 08  
Lemhi Co.: Umpleby, 13  
Nampa quadrangle: Lindgren, 04  
Silver City quadrangle: Lindgren, 04a  
Snake River plains: Russell, 02a  
Illinois: Rolfe, 03, 08a  
Belleville and Breese quadrangles: Udden, 15  
Danville quadrangle: Campbell (M R), 00  
Galena-Elizabeth quadrangles: Shaw (E W), 16; Trowbridge, 16  
Murphysboro and Herrin quadrangles: Shaw, (E W), 12b  
northern: Udden, 95  
northwestern: Bain, 05a; northwestern: Carman, 09  
Patoka quadrangle, Fuller, 04  
St. Louis area: Fenneman, 09, 11  
Starved Rock State Park: Cady, 18  
Tallula and Springfield quadrangles: Shaw (E W), 13a  
Indiana: Blatchley (W S), 04; Hopkins (T C), 04a  
Danville quadrangle: Campbell (M R), 00  
Ditney quadrangle: Fuller, 02

## Geologic history—Continued.

- Indiana: Flatwoods region, Owen and Monroe cos.: Malott, 15  
glacial: Wood (H W), 16  
Patoka quadrangle, Fuller, 04  
Indian Territory: Taff, 06  
Iowa: Bain, 95f; Calvin, 98d  
channel of Mississippi River: Calvin, 07  
Des Moines Valley: Lees, 16  
eastern: Carman, 09  
Elk Point quadrangle: Todd, 08  
Galena quadrangle: Shaw (E W), 16  
Johnson Co.: Calvin, 85a  
Lancaster quadrangle: Grant (U S), 07  
northeastern: McGee, 91  
northwestern: Carman, 17  
Pleistocene: Calvin, 97f  
Jackson and Vicksburg deposits, Ala. and Miss.: Cooke (C W), 18a  
Jamaica: Hill (R T), 99; Spencer (J W), 98c  
Kansas: Moore (R C), 17; Wooster, 00, 14  
Carboniferous: Beede, 09a  
crystalline rocks: Moore (R C), 18a  
Independence quadrangle: Schrader, 08  
Joplin district: Smith (W S T), 07a  
Leavenworth quadrangle: Ifinds, 17  
Pleistocene: Todd, 18  
Wakarusa Creek: Todd, 11a  
Kentucky, Jefferson Co.: Butts, 15  
Kenova quadrangle: Phalen, 12  
London quadrangle: Campbell (M R), 98a  
north central: Miller (A M), 16  
Richmond quadrangle: Campbell (M R), 98  
western: Crider, 15  
Klamath Mountains: Diller, 01a, 02a  
Lake Agassiz: Upham, 96  
Lake Bonneville: Gilbert, 90  
Lake Champlain: Perkins (G H), 12a  
Lake Lahontan: Jones (J C), 14a  
Lake Superior: Bell (R), 99a  
Lake Superior region: Van Hise, 11  
Laurentian basin: Russell, 93c  
Lesser Antilles: Hill (R T), 03c  
Louisiana: Harris, 02a; Veatch (A C), 06e, g  
Maine, Eastport quadrangle: Bastin, 14  
Fox Islands: Smith (G O), 96, 02a  
Mount Desert Island: Davis (W M), 94e  
Penobscot Bay quadrangle: Smith (G O), 07d  
Portland and Casco Bay quadrangles: Katz, 13  
Rockland quadrangle: Bastin, 08a  
southern: Clapp (F G), 09  
southwestern: Emmons (W H), 10a  
Waterville: Little (H P), 17a  
Maryland: Md G S, 12; Miller (B L), 06; Shattuck, 06, 06a  
Alleghany Co.: O'Harra, 00  
Anne Arundel Co.: Little, 17  
Baltimore area: Uhler, 83  
Calvert Co.: Shattuck, 07  
Cecil Co.: Shattuck, 02  
Choptank quadrangle: Miller (B L), 12  
Coastal Plain: Davis (W M), 07a  
Garrett Co.: Martin (G C), 02  
Nomini quadrangle: Darton, 96a  
Paleozoic: Willis, 00



## Geologic history—Continued.

- Maryland: Patuxent quadrangle: Shattuck, 07c  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 St. Marys Co.: Shattuck, 07a  
 Tolchester quadrangle: Miller (B L), 17  
 Upper Cretaceous: Clark (W B), 16  
 Washington quadrangles: Darton, 01
- Massachusetts: Mansfield, 06a  
 Blue Hills complex: Crosby, 98  
 Boston and vicinity: Crosby, 03  
 Massachusetts, Boston Basin: Bouvé, 84;  
 Crosby, 90; postglacial: Shiner, 18  
 Cape Cod district: Shaler, 98a  
 Charles River: Clapp (F G), 01  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 eastern: Loughlin, 11  
 Mount Greylock: Dale, 06  
 Narragansett Basin: Shaler, 99  
 Nashua Valley: Crosby, 99a  
 western: Emerson (B K), 98a
- Mesozoic, southern North America: Stanton, 18  
 Mesozoic floras of North and South America: Knowlton, 18
- Mexico: Aguilera, 98a; Haarman, 17  
 Chihuahua, Sierra Rica country: Caracristi, 09  
 Coahuila: Haarman, 13  
 coastal area: Dumble, 15c  
 Durango, Sierra de El Oro: Roldán, 11  
 eastern: Dumble, 15a  
 Hidalgo, Tulancingo: Galvez, 16; Villarello, 02  
 Ixmiquilpan Valley, Hidalgo: Paredes, 09b  
 Pachuca district, Hidalgo: Pope, 11  
 Promontorio district, Durango: Lincoln, 08  
 Sonora, Cananea district: Emmons (S F), 10a  
 Tampico embayment area: Dumble, 18  
 Velardeña district, Durango: Spurr, 08a
- Michigan: Lane, 09, 09a  
 Detroit district: Sherzer, 17  
 Menominee district: Bayley, 04; Van Hise, 00  
 Upper Peninsula: Lane, 16; Russell, 05a  
 Washtenaw Co.: Winchell (A), 81a
- Michigan Basin: Grimsley, 04c
- Mid-Cretaceous geography: Berry, 06a
- Minnesota, glacial: Upham, 83  
 Little Falls: Winchell (N H), 02c  
 Mesabi district: Leith, 03  
 Mesabi range: Grant (U S), 98  
 Minneapolis-St. Paul district: Sardeson, 16  
 northeastern: Winchell (A), 87  
 Redstone region: Sardeson, 08a  
 southern: Hall (C W), 11a  
 Vermilion district: Clements, 03
- Mississippi: Lowe, 15; northern and central, Pliocene: Shaw, 18  
 Mississippi delta: Forshey, 74  
 Mississippi drainage system: Westgate, 93  
 Mississippi embayment: Berry, 15  
 Mississippi River: Calvin, 07; Farnsworth, 01; Spencer (J W), 83b  
 Mississippi Valley, lower: Hilgard, 69a; upper: Bain, 06; Mead (D W), 94; late Paleozoic: Van Tuyl, 18c
- Mississippi-Missouri: Claypole, 89a

## Geologic history—Continued.

- Missouri: Branson, 18a; Hinds, 15; Shepard, 07; Swallow, 73; Winslow, 95  
 barite districts: Tarr (W A), 18  
 Granby area: Buckley, 06  
 Joplin district: Smith (W S T), 07a  
 Jackson Co.: McCourt, 17  
 Joplin district: Siebenthal, 05  
 Leavenworth quadrangle: Hinds, 17  
 Ozark region: Broadhead, 89; Park, 04  
 Paleozoic: Broadhead, 94  
 St. Louis area: Fenneman, 09  
 St. Louis quadrangle: Fenneman, 11  
 Smithville quadrangle: Hinds, 17  
 southeastern: Buckley, 09; Marbut, 02  
 southwestern: Schmidt, 74
- Missouri River: Bauer, 15; Broadhead, 89a; Todd, 14; West, 83
- Missouri River region: Upham, 96d
- Montana, Boulder batholith: Billingsley, 15, 17  
 Butte district: Atwood, 16  
 Castle Mountain district: Weed, 96a  
 Cretaceous: Thom, 17; and Tertiary: Stanton, 09  
 eastern: Rowe, 16  
 Elkhorn Mountains: Stone (R W), 11  
 Fort Benton quadrangle: Weed, 99  
 Garrison-Philipsburg fields: Pardee, 17  
 Glacier National Park: Campbell (M R), 14b  
 Judith Mountains: Weed, 98  
 Little Belt Mountains: Weed, 99a, 00  
 Marysville district: Barrell, 07  
 northern and central: Mortson, 76  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 13b  
 southwestern: Pardee, 13a  
 Three Forks quadrangle: Peale, 96
- Morrison formation: Mook, 15
- Nebraska: Hicks, 90a  
 Camp Clarke quadrangle: Darton, 03  
 Elk Point quadrangle: Todd, 08  
 Scotts Bluff quadrangle: Darton, 03a  
 Sioux City region: Burchard, 04
- Neocene and Pleistocene: McGee, 91g
- Nevada, Big Smoky Valley: Meinzer, 17  
 Bullfrog district: Ransome, 10c  
 Contact district, Elko Co.: Schrader, 12  
 Elko, Lander, and Eureka cos.: Emmons (W H), 10  
 Goldfield district: Ransome, 09, 10a  
 Great Basin: Ball (S H), 07  
 Humboldt region: Louderback, 04a  
 Lahontan Basin: Jones (J C), 14a; Russell, 85  
 Reese River basin: Waring (G A), 18  
 southeastern: Carpenter (E), 15  
 Tonopah: Burgess, 09; Spurr, 03b, 05  
 Virgin Valley region: Merriam (J C), 10b  
 west central: Buwalda, 14b  
 Yerington district: Knopf, 18a
- New Brunswick: Bailey (L W), 90a, 10; Matthew (G F), 08, 14  
 Bathurst district: Young, 11a  
 Curries Mountain: Bailey (L W), 10a  
 St. John River: Bailey (L W), 83; Matthew (G F), 94d
- New England: Cleland, 06; Anon, 16c



## Geologic history—Continued.

- New Hampshire: Hitchcock (C H), 74c, 75, 77a  
 White Mountains: Dawson (J W), 62b  
 Winnipisauke Lake: Hitchcock (C H), 74e  
 New Jersey: Hollick, 99b; Lewis, 15; Salisbury, 98a  
**Franklin Furnace quadrangle:** Spencer (A C), 08d  
 Lake Passaic: Salisbury, 95b  
 Passaic Falls: Nelson, 92  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 Raritan quadrangle: Bayley, 14  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Jewett, 05; Keyes, 06b; Lindgren, 10  
 Deming quadrangle: Darton, 17  
 Gallup Basin: Kirk, 14  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Raton Mesa region: Lee (W T), 17  
 Rio Grande Valley: Lee (W T), 07b, 09b  
 Santa Rita region: Paige, 12d  
 Silver City quadrangle: Paige, 16  
 southern: Darton, 17a  
 Tertiary peneplain: Robinson (H H), 07  
 Tularosa Basin: Meinzer, 15  
 New York: Miller (W J), 14  
 Adirondack Mountains: Cushing, 05, 07; Kemp, 97b; Miller (W J), 17a; northern: Cushing, 05a; southern: Miller (W J), 13  
 Blue Mountain quadrangle: Miller (W J), 17  
 Broadalbin quadrangle: Miller (W J), 11b  
 Catskill Mountains: Heilprin, 07  
 Cayuga Lake valley: Nevius, 99a  
 Chautauqua region: Tarr (R S), 96b  
 Clinton Co.: Cushing, 01  
 Devonian: Smith (B), 12  
 eastern: Dale, 99  
 Erie Co.: Houghton (F), 14  
 Hudson Valley: Dale, 04a  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Long Island: Crosby, 00a, 08; Fuller, 14; Merrill (F J H), 86; Veatch (A C), 06c  
 Manhattan Island: Newberry, 78e  
 New York City: Berkey, 12a  
 New York district: Merrill (F J H), 02  
 Niagara quadrangle: Kindle, 13c  
 North Creek quadrangle: Miller (W J), 14a  
 Ogdensburg region: Cushing, 16  
 Ordovician: Cushing, 08  
 Paradox Lake quadrangle: Ogilvie, 05  
 Peekskill district: Loveman, 11  
 Pleistocene: Fairchild, 08, 13  
 Poughkeepsie quadrangle: Gordon (C E), 11  
 Rochester: Fairchild, 94c  
 Saratoga quadrangle, glacial: Stoller, 16  
 Saratoga Springs region: Cushing, 14  
 Schoharie Valley: Grabau, 06  
 southeastern: Berkey, 11  
 South Onondaga: Schneider, 04  
 Ten Mile River region: Crosby, 00b  
 Watkins Glen-Catatonk district: Williams (H S), 09a  
 western, in Silurian time: Hartnagel, 07b  
 Niagara Falls: Gilbert, 95; Spencer (J W), 94e, 13c; Upham, 05d

## Geologic history—Continued.

- Niagara Falls and Gorge: Taylor (F B), 13a  
 Niagara Gorge and Great Lakes history: Taylor (F B), 13d  
 Niagara River: Belt, 75; Gilbert, 90a  
 Nicaragua, Canal route: Hayes, 99, 99a; lake region: Hayes, 99c  
 North America: Dana (J D), 56b; Hall, 69; Hunt, 74a; Shimer, 07b; White (C A), 85c; Willis, 10a; development: Le Conte, 86a; early history: Hitchcock (C H), 83  
 North American flora: Newberry, 80  
 North Atlantic: Dawson (J W), 86  
 North Carolina: Asheville quadrangle: Keith, 04  
 Chapel Hill: Smith (J E), 14  
 Coastal Plain: Clark (W B), 12, 12a  
 Davidson Co.: Pogue, 09b; Cid district: Pogue, 10  
 Gold Hill district: Laney, 10  
 Nantahala quadrangle: Keith, 07  
 Pisgah quadrangle: Keith, 07a  
 Virgilina district: Laney, 17  
 North Dakota: Leonard, 08b, 17; Willard, 08  
 Bismarck quadrangle: Leonard, 12  
 Maple River: Willard, 08  
 south central: Leonard, 12b  
 Tower quadrangle: Willard, 08  
 Nova Scotia: DeWolfe, 06; Knight (O W), 11; Malcolm, 12; Matthew (G F), 08a  
 Arisaig-Antigonish district: Williams (M Y), 11  
 Gaspereau Valley: Haycock, 02  
 Joggins section: Bell (W A), 14  
 Shelburne Co.: Powers, 15a  
 South Joggins: Dawson (J W), 54  
 Ohio: Carney, 11a  
 Cincinnati region: Fenneman, 16  
 Columbus quadrangle: Hubbard (G D), 15  
 Kenova quadrangle: Phalen, 12  
 Licking Co.: Herrick, 87  
 Oklahoma: Gould, 11, 11b; Wallis, 15  
 Arbuckle Mountains: Reeds, 10  
 Carboniferous: Beede, 09a  
 Carter Co.: Wegemann, 15b  
 northeastern: Snider, 12  
 southern: Powers, 17b  
 Tahlequah quadrangle: Taff, 05  
 Talihina region: Woodworth, 12  
 travertine deposits: Emig, 17  
 Ontario, central: Wilson (A W G), 01  
 Lake Wendigokan region: Moore (E S), 09c  
 Nipigon Basin: Wilson (A W G), 09, 10  
 Pleistocene: Coleman, 09c; Taylor (F B), 13b  
 Rainy Lake: Lawson, 13d  
 western: Coleman, 98b  
 Ordovician meteorology: Sardeson, 00  
 Ordovician, Silurian, and Devonian: Grabau, 09a  
 Oregon, Cascades: Smith (W D), 17  
 Columbia River gorge region: Williams (I A), 16a  
 Crater Lake: Diller, 12  
 Curry Co.: Butler (G M), 16  
 Port Orford quadrangle: Diller, 03  
 Sumpter quadrangle: Pardee, 14  
 Tertiary: Arnold, 13  
 Wallowa Mountains: Smith (W D), 18  
 Ozark uplift: Broadhead, 89; Siebenthal, 15



## Geologic history—Continued.

Pacific coast region: Becker, 87c; Diller, 94; Smith (J P), 94; Tolman, 15; Tertiary: Arnold, 09b

Paleozoic: Rogers (H D), 57b; Ruedemann, 08; Ulrich, 11a

Panama: Hershey, 01d

Panama Isthmus: Hill (R T), 98c

Pennsylvania: Claypole, 90a; Davis (W M), 89f; Leeds, 71; Stone (R W), 08b

Amity quadrangle: Clapp (F G), 07a

anthracite region: Wistar (I J), 96

Barnesboro and Patton quadrangles: Campbell (M R), 13a

Beaver quadrangle: Woolsey, 05

Burgettstown and Carnegie quadrangles: Shaw (E W), 11d

Chester Co., Doe Run-Avondale region: Bliss (E F), 16

Claysville quadrangle: Munn, 12

Coatesville quadrangle: Bliss (E F), 14

Ebensburg quadrangle: Butts, 05b

Elders Ridge quadrangle: Stone (R W), 05a

Elkland quadrangle: Fuller, 03a

Foxburg and Clarion quadrangles: Shaw (E W), 11e

Gaines quadrangle: Fuller, 03

Johnstown quadrangle: Phalen, 10

Kittanning quadrangle: Butts, 04

Latrobe quadrangle: Campbell (M R), 04

Lehigh Co.: Miller (B L), 14

Masontown quadrangle: Campbell (M R), 02a

Mercersburg-Chambersburg district: Stose, 09

middle: Claypole, 84k

Pawpaw and Hancock quadrangles: Stose, 12b

Philadelphia area: Bascom, 97, 09a; Lewis (H C), 83b

Piedmont district: Bascom, 05

Rogersville quadrangle: Clapp (F G), 07b

Rural Valley quadrangle: Butts, 05a

Sewickley quadrangle: Munn, 11

Susquehanna River: Mathews, 17

Tioga quadrangle: Fuller, 03a

Trenton quadrangle: Bascom, 09b

Uniontown quadrangle: Campbell (M R), 02a

Warren quadrangle: Butts, 10

Waynesburg quadrangle: Stone (R W), 05

western: Butts, 08a

Porto Rico: Berkeley, 15a; Reeds, 16

Pre-Cambrian: Coleman, 15

Puget Sound basin: Kimball, 97

Quebec, Beauce Co.: Tyrrell, 15

Coleraine area: Knox, 18

Haliburton and Bancroft areas: Adams (F D), 10d

Kewagama Lake area: Wilson (M E), 13c

Lake Timiskaming area: Wilson (M E), 10a

Lake St. John district: Dresser, 16

Montreal Island: Adams (F D), 04

Mount Royal: Buchan, 01

Northern Transcontinental Railway, Hervey Junction-Doucet: Bancroft (J A), 17

St. Bruno Mountain: Dresser, 10a; Hunt, 71k

Southern: Dresser, 12, 13

Thetford-Black Lake district (Coleraine sheet): Knox, 17

## Geologic history—Continued.

Rhode Island: Emerson (B K), 17

Diamond Hill-Cumberland district: Warren (C H), 14

Narragansett Basin: Shaler, 99

Rocky Mountain region: Ashley, 15a; Lee (W T), 15b; Tomlinson, 17

Canada: Allan, 17; Dawson (G M), 01

Cretaceous-Tertiary time: Ashley, 15b

southern, Mesozoic: Lee (W T), 18

Saint Croix Dalles: Upham, 00

Saint Croix River: Upham, 96q

St. Peter time: Berkeley, 06

Saskatchewan, Amisk Lake district: Bruce, 18; Wood Mountain - Willowbunch area: Rose, 16

Sierra Nevada: Lindgren, 96c

Sombrero, West Indies: Julien, 66

South Carolina: Rogers (G S), 14a

coast region: Shaler, 70a

Pisgah quadrangle: Keith, 07a

Pleistocene: Pugh, 05

South Dakota: Todd, 95

Aberdeen-Redfield district: Todd, 09

Alexandria quadrangle: Todd, 03c

Belle Fourche quadrangle: Darton, 09e

Black Hills: Claypole, 92b; Darton, 01a, 09; southern: O'Harra, 99

De Smet quadrangle: Todd, 04a

Edgemont quadrangle: Darton, 04a

Elk Point quadrangle: Todd, 08

Huron quadrangle: Todd, 04

James River valley: Todd, 04b

Mitchell quadrangle: Todd, 03b

Oelrichs quadrangle: Darton, 02a

Olivet quadrangle: Todd, 03

Parker quadrangle: Todd, 03a

south central: Perisho, 12

Tennessee: Ashley, 10b; Safford, 58

Briceville quadrangle: Keith, 96b

Bristol quadrangle: Campbell (M R), 99a

central basin: Kennedy, 89

Johnson Co.: Jenkins, 16

Loudon quadrangle: Keith, 96

Morristown quadrangle: Keith, 96a

Perry Co.: Wade (B), 14

Standingstone quadrangle: Campbell (M R), 99

Wartburg quadrangle: Keith, 97

Tennessee River, Tertiary history: Johnson (D W), 05

Tertiary: Berry, 17

Montana-Idaho-Washington: Hershey, 12

Pacific coast: Arnold, 09b

western North America: Osborn, 09

Texas: Dumble, 15a, 16a; Tarr, 90c, 93a; Udden, 16a

Austin quadrangle: Hill (R T), 02

Black and Grand prairies: Hill (R T), 01

Carboniferous: Baker (C L), 16

central: Comstock, 90

coastal area: Dumble, 15c

Colorado River: Hill (R T), 89f

Dallas Co.: Shuler, 18

east of Brazos River: Kennedy, 95a

El Paso quadrangle: Richardson (G B), 09

Llano and Burnet quadrangles: Paige, 12



## Geologic history—Continued.

- Texas: Llano Estacado, northern: Baker (C L), 15  
 Neuces quadrangle: Hill (R T), 98a  
 northeastern: Gordon (C H), 11  
 trans-Pecos front range: Baker (C L), 17  
 Van Horn quadrangle: Richardson (G B), 14  
 Tides: Newberry, 82b  
 Triassic, Connecticut Valley and New Jersey: Russell, 78b  
 Trinidad: Guppy, 02, 05  
 United States: Blackwelder, 12; eastern, Catoctin belt: Keith, 94a  
 Utah: Umpleby, 12a; Richardson, (G B), 06  
 Bingham Canyon: Atwood, 16  
 Boxelder and Tooele cos.: Carpenter, 13  
 Canyon Range: Loughlin, 14  
 Juab, Millard, and Iron cos.: Meinzer, 11a  
 Lake Bonneville region: Keyes, 17  
 Park City district: Boutwell, 12  
 San Francisco district: Butler (B S), 13  
 southern: Leith, 08a  
 Tintic district: Crane, 15; Smith (G O), 00; Tower, 99  
 Toquerville region; Huntington, 03, 04  
 Uinta Range: Weeks, 07  
 Vermilion district: Clements, 04  
 Vermont: Perkins (G H), 11  
 Champlain Valley: Hitchcock (C H), 06a  
 Green Mountain region: Perkins, 12  
 Irasburg: Richardson (C H), 12b  
 marble belt: Brainerd, 85  
 northwestern: Perry, 71e  
 western: Dale, 99, 14  
 Virginia, Bristol quadrangle: Campbell (M R), 99a  
 Carboniferous: Branson, 12  
 Coastal Plain: Clark (W B), 12b  
 Fredericksburg quadrangle: Darton, 94d  
 James River basin: Taber (S), 13  
 Massanutten Mountain: Spencer (A C), 97  
 Nomini quadrangle: Darton, 96a  
 Virgilina district: Laney, 17  
 Washington: Smith (G O), 06b  
 Big Bend region, glacial history: Meinzer, 18b  
 Blewett district: Weaver, 11  
 Cascade Mountains: Daly (R A), 06a; Geballe, 17  
 Colville Indian Reservation: Pardee, 18a  
 Covada district: Weaver, 13  
 Ellensburg quadrangle: Smith (G O), 03  
 Index mining district: Weaver, 12  
 Kittitas Co.: Saunders, 14  
 Monte Cristo district: Spurr, 01  
 Mount Stuart quadrangle: Smith (G O), 04  
 Myers Creek mining district: Umpleby, 11  
 northeastern: Bancroft (H), 14  
 Oroville-Nighthawk mining district: Umpleby, 11a  
 Skykomish basin: Smith (W D), 15; Smith (W S), 16  
 south central: Waring (G A), 13  
 Tacoma quadrangle: Willis, 99  
 Tertiary: Arnold, 13  
 western: Leighton (M M), 18; Weaver, 12a, 16  
 West Indies: Vaughan, 18c

## Geologic history—Continued.

- West Virginia, Charleston quadrangle: Campbell (M R), 01  
 Huntington quadrangle: Campbell (MR), 00a  
 Kenova quadrangle: Phalen, 12  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Raleigh quadrangle: Campbell (M R), 02  
 Windward Archipelago: Hill (R T), 05  
 Wisconsin: Buckley, 98; Hotchkiss, 12; Weidman, 15  
 Devil's Lake region: Trowbridge, 17  
 Douglas Co.: Grant (U S), 00  
 Green Lake Co.: Alden, 12a  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
 Milwaukee triangle: Alden, 06  
 southeastern, Pleistocene: Alden, 18  
 Wyoming: Aughey, 86; Darton, 08; Trumbull, 17  
 Absaroka Range: Hague, 99c  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Big Horn basin: Fisher (C A), 06  
 Big Horn mountains: Darton, 06e  
 Black Hills region: Darton, 09  
 Byron field: Ziegler, 17  
 Cenozoic: Baker (C L), 12a  
 central western: Blackwelder, 14a  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Cody region: Sinclair, 12a  
 Cretaceous and Tertiary: Stanton, 09  
 Devil's Tower quadrangle: Darton, 07b  
 Fremont Co.: Jamison, 11a; Copper Mountain district: Trumbull, 16a  
 Hartville quadrangle: Smith (W S T), 03  
 Laramie and Sherman quadrangles: Darton, 10c  
 Laramie region, Cenozoic: Blackwelder, 09a  
 Newcastle quadrangle: Darton, 04  
 Oregon Basin field: Ziegler, 17a  
 Owl Creek Mountains: Darton, 06  
 Park Co.: Moody, 18  
 Sundance quadrangle: Darton, 05a  
 Sweetwater Co.: Schultz, 10  
 western: Blackwelder, 15  
 Wind River and Big Horn basins: Sinclair, 11a  
 Wind River Mountains, Cenozoic history: Westgate, 13  
 Yellowstone National Park: Hague, 88, 96, 12  
 Yukon, Wheaton district: Cairnes, 12  
 Geologic mapping: Lyman, 73; Winslow, 91d  
 Geologic maps.  
 Acadian Triassic: Powers, 16  
 Alabama: Eckel, 13; McCalley, 96; Smith (E A), 78, 87, 88, 94b, 04, 05a, 07, 17; Tuomey, 50, 58  
 Atlanta-Greenville: Campbell (J L), 83  
 Birmingham district, economic products: Buchard, 10c  
 Birmingham quadrangle: Butts, 10a  
 Birmingham Valley: Burchard, 10c  
 Birmingham-Macon belt: Spencer (J W), 89  
 Black Warrior River: Smith (E A), 81



## Geologic maps—Continued.

Alabama: Blount Mountain: Gibson, 93a  
 Cahaba coal field: Butts, 11; Smith (E A), 05; Squire, 90  
 coal fields: McCalley, 91  
 Coosa coal field: Prouty, 12; Smith (E A), 76a  
 Coosa Valley: Hayes, 94 e  
 Fayette Co.: Smith (E A), 79  
 Fayette district: Munn, 11c  
 Gadsden quadrangle: Hayes, 96  
 Hatchetigbee anticline: Hopkins (O B), 17b  
 iron region: Willis, 86a  
 marble deposits: Prouty, 16  
 Marion Co.: Smith (E A), 79  
 northeastern: Hayes, 92  
 Stevenson quadrangle: Hayes, 95  
 Tombigbee Valley: Eckel, 05h  
 Walker Co.: Smith (E A), 79  
 Warrior coal basin: McCalley, 98  
 Winston Co.: Smith (E A), 79  
 Alaska: Brooks (A H), 07, 08; Grewingk, 50; Wright (F E), 06e  
 Admiralty Island: Wright (C W), 06a  
 Alaska Peninsula: Atwood, 11  
 Alaska Range glaciers: Capps, 12b  
 Alatna-Noatak region: Smith (P S), 12a  
 antimony deposits: Brooks (A H), 16a  
 Anvik-Andreafski region: Harrington (G L), 17, 18  
 Bering River field: Fisher (C A), 14  
 Bonfield region: Capps, 12  
 Bremner River region: Moffit, 12a  
 Broad Pass region: Moffit, 14a, 15  
 Cape Lisburne region: Collier, 06  
 Cape Nome region: Schrader, 00  
 central: Brooks (A H), 11a  
 Chicagof Cove: Palache, 04b  
 Chignik Bay coal field: Atwood, 09a  
 Chignik Bay region: Atwood, 11  
 Chisana-White River district: Capps, 16  
 Chitina copper belt: Schrader, 01  
 Chitina Valley: Moffit, 18  
 Circle quadrangle: Prindle, 13b  
 coal-bearing rocks: Brooks (A H), 02  
 Controller Bay region: Martin (G C), 05a, 08  
 Cook Inlet oil field: Martin (G C), 05a  
 Cook Inlet region: Atwood, 09a  
 Copper Mountain area: Wright (C W), 09, 15  
 Copper Mountain region: Brooks (A H), 11a  
 Copper River basin, economic: Moffit, 17  
 Copper River glaciers: Martin (L), 12  
 Copper River region: Mendenhall, 05; Moffit, 12; Nikolai Creek: Brooks (A H), 11a  
 Cosna-Nowitna region: Eakin, 16a, 18  
 Ellamar district: Capps, 13a, 15a  
 Fairbanks and Rampart quadrangles: Prindle, 08  
 Fairbanks district: Prindle, 09a, 10  
 Fairbanks quadrangle: Prindle, 13  
 Fort Hamlin to Kotzebue Sound: Mendenhall, 02  
 Fortymile district: Spurr, 98a  
 Fortymile quadrangle: Prindle, 09  
 Glacier Bay: Reid (H F), 96  
 glaciers: Tarr (R S), 14a; of Wrangell and Nutzotin Mountains: Capps, 10  
 gold and coal fields: Emmons (S F), 98a

## Geologic maps—Continued.

Alaska: Grand Central quadrangle: Moffit, 13  
 Gravina and Revillagigedo islands: Chapin, 18a  
 Gravina Island: Smith (P S), 15  
 Gulkana-Susitna region: Moffit, 12  
 Hanagita Valley: Moffit, 12a  
 Hanagita-Bremner region: Moffit, 14  
 Herendeen Bay and Unga Island region: Atwood, 11  
 Herendeen Bay coal field: Atwood, 09a  
 Iditarod-Ruby region: Eakin, 14  
 Iliamna and Clark lakes region: Martin (G C), 10a  
 Iliamna region: Martin (G C), 12a  
 Innoko, central Kuskokwim, and lower-central Yukon regions: Maddren, 10  
 international boundary: Cairnes, 14  
 Juneau, Skagway, and Sitka districts: Burchard, 14b  
 Juneau gold belt: Knopf, 12; Spencer (A C), 06a  
 Kantishna region: Capps, 17  
 Kasaan Peninsula: Wright (C W), 15  
 Kenai Peninsula: Martin (G C), 15  
 Kennicott region: Moffit, 17  
 Ketchikan district: Brooks (A H), 02a; Wright (C W), 15; Wright (F E), 08; mineral deposits: Chapin, 16  
 Kodiak and neighboring islands: Martin (G C), 13  
 Kotsina-Chitina copper belt: Brooks (A H), 11a; Moffit, 08a  
 Kotsina-Kuskulana district: Moffit, 15a  
 Kowak to Allen River: Mendenhall, 02  
 Koyukuk-Chandalar region: Maddren, 13  
 Kuskokwim region: Smith (P S), 15a  
 Lake Clark-central Kuskokwim region: Smith (P S), 17  
 Latouche Island: Grant (U S), 10b  
 Marshall mining district: Harrington (G L), 18  
 Matanuska coal field: Martin (G C), 06b, 11  
 Matanuska Valley: Martin (G C), 12b  
 mineral resources: Brooks (A H), 06d  
 Mission Creek: Spurr, 98a  
 Mount McKinley region: Brooks (A H), 11  
 Muir Glacier region: Cushing, 92  
 Nelchina-Susitna region: Chapin, 15, 18  
 Neocene: Becker, 98  
 Nizina district: Moffit, 11a  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome quadrangle: Moffit, 13  
 northern: Schrader, 04  
 Norton Bay region: Mendenhall, 01  
 Nulato-Norton Bay region: Smith (P S), 11c  
 Omilak region: Smith (P S), 11c  
 Porcupine district: Eakin, 17a; Wright (C W), 04a  
 Porcupine River: Kindle, 08a  
 Prince of Wales Island, Kasaan Peninsula: Wright (C W), 09  
 Prince William Sound: Grant (U S), 10b; Schrader, 01; Latouche and Knight Island districts: Johnson (B L), 17a; mineral resources: Johnson (B L), 15  
 Quaternary: Maddren, 05



## Geologic maps—Continued.

- Alaska: Rampart and Hot Springs districts: Eakin, 12, 13  
 Rampart region: Prindle, 06b  
 Ruby, Innoko, and Iditarod districts: Eakin, 13a  
 Ruby-Kuskokwim region: Mertie, 16  
 Seward Peninsula: Brooks (A H), 01, 11a; Collier, 02; Knopf, 08b; Moffit, 05, 13; Smith (P S), 13c; Solomon and Casadepaga quadrangles: Smith (P S), 10; western part: Kindle, 11d  
 Shungnak region: Smith (P S), 11  
 Sitka district: Knopf, 12a  
 southeastern: Brooks (A H), 02a, b, 11a; Smith (P S), 11c; Wright (C W), 08; Prince Rupert to Skagway: Wright (F E), 13c  
 southwestern: Spurr, 00  
 Tolovana district: Mertie, 17  
 Turnagain-Knik region: Capps, 16a  
 upper Yukon region: Brooks (A H), 08a  
 Valdez Creek area: Moffit, 11  
 White and Tanana River basins: Brooks (A H), 00  
 Willow Creek district: Capps, 14, 15b  
 Wrangell district: Wright (F E), 08  
 Wrangell Mountains, region: Rohn, 00  
 Yakutat Bay region: Tarr (R S), 09a  
 Yentna district: Capps, 12a, 13  
 York region: Collier, 04  
 Yukon gold belt: Spurr, 98a  
 Yukon River (upper) region: Prindle, 12  
 Yukon-Koyukuk region: Eakin, 14b, 16  
 Yukon-Tanana region: Brooks (A H), 11a; Prindle, 05, 08a  
 Alaska-Yukon-British Columbia: Brooks (A H), 00a  
 Alberta: Bryce, 07; Dowling, 09b; Malcolm, 13; Ries, 12c  
 Athabasca-Churchill rivers region: Tyrrell, 96  
 Banff district: Adams (F D), 15a; De Schmid, 16a  
 Banff-Golden: Allan, 13  
 Bighorn coal basin: Malloch, 11  
 Blairmore area: MacKenzie, 14  
 Blairmore-Frank coal fields: Dowling, 13b; Leach, 03  
 Bow and Belly rivers region: Dawson (G M), 85  
 Bow River Valley: Walcott, 08a  
 Cascade coal basin: Dawson (G M), 96; Dowling, 07  
 coal fields: Dowling, 09, 13b  
 Costigan coal basin: Dowling, 05  
 Crowsnest Mountain: Leach, 13  
 Laggan-Field: Allan, 13  
 Moose Mountain district: Cairnes, 07  
 Mountain Park coal area: Stewart (J S), 17  
 North Saskatchewan River, country south of: Tyrrell, 87  
 Rocky Mountain region: Dawson (G M), 86  
 Sheep River field: Dowling, 14a  
 southern: Dowling, 16a, 17  
 Yellow Head Pass region: McEvoy, 00  
 Algonquin and Iroquois beaches, isobase map of: Goldthwait, 10a

## Geologic maps—Continued.

- Antigua: Purves, 85; Spencer (J W), 01  
 Appalachian coal field: White (D), 02  
 Appalachian coal measures: White (I C), 91  
 Appalachian province: Willis, 93b  
 Appalachian, southern, coal field: Hayes, 02b  
 Appalachians, southern: Willis, 93b  
 Archean and Algonkian: Van Hise, 92  
 Arctic Archipelago: Haughton, 59  
 Arctic regions: Dawson, 87a; De Rance, 75; Gregory (J W), 97; Haughton, 57, 59; Schei, 04; (part): Bugge, 10  
 Ellesmere Land: Hottedahl, 14, 17; Kiaer, 15; Schei, 04  
 Grinnell Land: Feilden, 78  
 Arizona (parts): Wheeler (G M), 76a  
 Bisbee quadrangle: Ransome, 04, 04b  
 Black Mesa coal field: Campbell (M R), 11c  
 Bradshaw Mountains quadrangle: Jaggar, 03  
 Carrizo Mountain: Emery, 16  
 Clifton quadrangle: Lindgren, 05  
 Clifton-Morenci district: Lindgren, 05a  
 Colorado Canyon: Walcott, 94  
 Elden Mountain: Robinson (H H), 13  
 Fort Apache region: Reagan, 03b  
 Globe mining district: Higgins (E), 10  
 Globe quadrangle: Ransome, 03, 04a  
 Grand Canyon: Walcott, 95a; Shinumo area: Noble, 10  
 Greaterville district: Hill (J M), 10  
 Jerome district: Provot, 16, 16a  
 Kofa Mountains: Jones (E L), 15a  
 Miami district: Herrick (R L), 10  
 Mohave Co.: Schrader, 16a  
 Mohave region: Schrader, 16  
 Mule Mountains: Bonillas, 16  
 Navajo country: Gregory (H E), 16a  
 northern: Darton, 10a; Newberry, 61  
 Pinedale coal field: Veatch (A C), 11  
 Salt River valley: Lee (W T), 05  
 San Franciscan field: Robinson (H H), 13  
 Santa Rita and Patagonia Mountains: Schrader, 15  
 Shinumo quadrangle: Noble, 14  
 Silverbell district: Stewart (C A), 12  
 Sulphur Spring Valley: Meinzer, 13  
 Tumamoc Hills: Tolman, 09  
 Turquoise district: Ransome, 13a  
 Warren district: Bonillas, 16  
 western: Lee (W T), 08a; Schrader, 09  
 Yuma Co.: Blanchard, 13  
 Arkansas: Branner, 96, 00; Eckel, 13; Purdue, 09; Veatch (A C), 06e  
 Batesville region: Penrose, 91; Van Ingen, 01  
 bauxite district: Hayes, 01a  
 Benton Co.: Simonds, 94  
 Buffalo City area: Branner, 00  
 Caddo Gap and De Quecn quadrangles: Miser, 18  
 chalk region: Taff, 02b  
 coal regions: Collier, 07b; Winslow, 88  
 Crowley's Ridge: Call, 91  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 Fayetteville quadrangle: Adams (G I), 05  
 Fort Smith-Poteau field: Smith (C D), 14



## Geologic maps—Continued.

Arkansas: Fourche Cove: Powell (W B), 42  
 igneous areas: Williams (J F), 91  
 iron regions: Penrose, 92  
 Magnet Cove: Washington, 00; Williams (J F), 91  
 marble regions: Hopkins (T C), 93  
 northeastern: Stephenson, 16a  
 northern: Adams (G I), 04; Purdue, 05; Paleozoic and Mississippi Embayment contact: Purdue, 05b  
 novaculite region: Griswold, 92  
 Ouachita Mountains: Purdue, 09a  
 Ozark region: Adams (G I), 01  
 Pike Co., peridotite area: Williams (J F), 91  
 St. Francis Co.: Call, 91  
 southern: Harris, 94  
 southwest-central: Miser, 13  
 southwestern: Hill (R T), 88; Miser, 18a  
 Washington Co.: Simonds, 91  
 Winslow quadrangle: Purdue, 07b  
 Yellville quadrangle: Adams (G I), 04  
 zinc region: Branner, 00  
 Aruba: Martin (K), 88  
 Barbados: Craig, 18; Harrison (J B), 90a, 07; Jukes-Browne, 91; Maycock, 21; Bissex Hill: Franks, 98  
 Bear River formation: White (C A), 95  
 Black Hills region: Meek, 58b; O'Harra, 10  
 Bonaire: Martin (K), 88  
 British Columbia: Dawson (G M), 81b  
 Agassiz-Vancouver: Camsell, 13a  
 Albert Canyon area: Daly (R A), 13a  
 Atlin district: Gwillim, 01; Taku Arm: Cairnes, 13  
 Beaverdell area: Reinecke, 15  
 Boundary district: LeRoy, 12, 13a  
 Bridge River area: Drysdale, 16  
 Cariboo district: Bowman, 88  
 coal fields: Dowling, 13b, 15a  
 coast region: Bancroft (J A), 13  
 Copper Mountain mining camp: Camsell, 07  
 Cranbrook area: Schofield, 14, 15  
 Crows Nest coal fields: Dowling, 13b  
 Crowsnest Mountain: Leach, 13  
 Ducks-Lytton: Drysdale, 13  
 East Kootenay district: McEvoy, 01  
 Elko to Kootenay Lake: Schofield, 13  
 Field area: Allan, 14  
 Flathead area: MacKenzie, 16a  
 Franklin mining camp, West Kootenay: Drysdale, 15  
 Fraser River-Coast Range: Dawson (G M), 78  
 Galiano, Mayne, and Saturna islands: Clapp (C H), 14f  
 Garibaldi volcanic area: Burwash, 14a  
 Glacier area: Daly (R A), 13a  
 Golden-Kamloops: Daly (R A), 15  
 Golden-Revelstoke: Daly (R A), 13a  
 Graham Island: Clapp (C H), 14a  
 Groundhog coal field: Malloch, 14  
 Hedley district: Camsell, 10a  
 Highland Valley copper camp: Drysdale, 16  
 Kamloops area: Dawson (G M), 95  
 Kootenay district, Sloean area: Drysdale, 17a; southeastern: Robertson (W F), 99  
 Laggan-Field: Allan, 13

## Geologic maps—Continued.

British Columbia: Lytton-Agassiz: Camsell, 13a  
 Midway to Princeton: Camsell, 13b  
 Nanaimo and New Westminster mining districts: LeRoy, 08  
 Nanaimo area: Clapp (C H), 12a, 14  
 Nicola coal basin: Ells, 05  
 northern interior: Camsell, 16a  
 Observatory Inlet: McConnell, 12  
 Portland Canal district: McConnell, 11, 12a, b, 13a  
 Prairie Hills and Dogtooth Mountains: Daly (R A), 13a  
 Prince Rupert to Telkwa: McConnell, 13  
 Princeton coal basin: Camsell, 07  
 Princeton to Spence Bridge: Camsell, 13b  
 Procter to Midway: LeRoy, 13  
 Queen Charlotte Islands: Dawson (G M), 81f  
 Queen Charlotte Sound and Burke Channel: Graham (R P D), 13  
 Revelstoke-Ducks: Daly (R A), 13a  
 Rocky Mountain region: Dawson (G M), 86  
 Rossland: Young (G A), 06a  
 Shuswap Lake, Kamloops district: Daly (R A), 15  
 Shuswap sheet: Dawson (G M), 98, 99a  
 Skagit Valley, Yale district: Camsell, 12b  
 southern interior: Dawson (G M), 77a  
 Telkwa River region: Leach, 07  
 Texada Island: LeRoy, 08; McConnell, 14  
 Thompson River valley: Drysdale, 14  
 Tulamecn district: Camsell, 13; Kemp, 02  
 Vancouver area: Burwash, 18  
 Vancouver Island: Clapp (C H), 12; Hector, 63  
 northern part: Dawson (G M), 87  
 Sooke and Duncan areas: Clapp, 17  
 southern: Clapp (C H), 12, 13c  
 Victoria area: Clapp (C H), 13b  
 West Kootenay sheet: Brock, 00a; McConnell, 01a; Ymir area: Drysdale, 17  
 Yellow Head Pass region: McEvoy, 00  
 British North America: Richardson (J), 51  
 California: Aubury, 02, 03; Eckel, 13; Guillemin-Tarayre, 71; Marcou, 83; Smith (J P), 16a; Whitney, 73a; (part): Blake (W P), 57  
 Alleghany district: Ferguson (H G), 14a  
 Angel Island: Ransome, 94  
 auriferous gravel deposits: Whitney, 80  
 Banner Hill area: Lindgren, 96  
 Barstow-Kramer region, San Bernardino Co.: Knopf, 18c; Pack, 14a  
 Bear Mountain: Turner, 94a  
 Berkeley Hills: Lawson, 02  
 Bidwell Bar quadrangle: Turner, 98  
 Big Trees quadrangle: Turner, 98a  
 Bishop and Mount Goddard (part) quadrangles: Knopf, 18  
 Camulos quadrangle: Waring (C A), 17  
 Carmelo Bay: Lawson, 93d  
 Coalinga district: Arnold, 08g, 10  
 Coalinga region: Pack, 14b  
 Coast Ranges: Antisell, 56; serpentines: Kramm, 10  
 Colfax quadrangle: Lindgren, 00  
 Colfax region: Moody, 17  
 Colorado Desert: Kew, 14; Vaughan, 17



## Geologic maps—Continued.

California: Cuyama Valley: English, 16  
 Dale iron-ore district: Harder, 10e  
 Death Valley and Mohave Desert: Campbell  
 (M R), 02b  
 Del Norte Co.: Hershey, 11a  
 Downieville quadrangle: Turner, 97  
 Eagle Mountain district: Harder, 12  
 eastern: Ball (S H), 07; Spurr, 03  
 Eldorado Co., Mother Lode belt: Crawford  
 (J J), 96  
 Golden Gate Hill: Turner, 94a  
 Grass Valley area: Lindgren, 96  
 Grizzly Peak: Turner, 94a  
 Honey Lake and Indian Valley quadrangles:  
 Diller, 08b  
 Inyo Co.: Waring (C A), 17e  
 Iron Mountain region, Shasta Co.: Hershey, 15  
 Jackson quadrangle: Turner, 94  
 Lake Co.: Dickerson, 14a  
 Lassen Peak district: Diller, 89  
 Lassen Peak quadrangle: Diller, 95  
 Livermore Valley: Branner, 12a  
 Los Angeles and Orange cos.: McLaughlin  
 (R P), 15  
 McKittrick district: Gester, 17  
 McKittrick-Sunset oil region: Arnold, 10a  
 Marysville quadrangle, Lindgren, 95  
 Marysville Buttes region: Dickerson, 13  
 Mineral King district: Knopf, 05  
 Modoc Co.: Tucker, 17b  
 Mohawk Valley: Turner, 91a  
 Monterey and San Luis Obispo eos.: Mc-  
 Laughlin (R P), 15  
 Mother Lode belt: Cal M As, 99  
 Mother Lode district: Ransome, 00  
 Mother Lode region: Fairbanks, 90  
 Mount Diablo: Turner, 91, 98b  
 Mount Diablo region (south): Dickerson, 16  
 Mount Ingalls: Turner, 94a  
 Mount Shasta: Diller, 15a  
 Mount Whitney, Olancha (part), and Bal-  
 larat (part) quadrangles: Knopf, 18  
 Mount Whitney quadrangle: Trowbridge, 11  
 Nevada City and Grass Valley districts:  
 Lindgren, 96b  
 Nevada City area: Lindgren, 96  
 Nevada Co.: Irelan, 90a  
 Ophir and Duncan Hill districts: Lindgren  
 94b  
 Oroville region: Lindgren, 11  
 Parkfield district: English, 18  
 Placer Co., Iowa Hill district: Irelan, 90a  
 Placerville quadrangle: Lindgren, 94  
 Placerville slate district: Dale, 14  
 Pleyto oil district: English, 18  
 Point Bonita: Ransome, 93  
 Point Reyes Peninsula: Anderson (F M), 99  
 Pyramid Peak quadrangle: Lindgren, 96a  
 quicksilver districts: Becker, 88; Bradley  
 (W W), 18a  
 Redding quadrangle: Diller, 06  
 Rock Creek quadrangle: Dickerson, 14c  
 Sacramento quadrangle: Lindgren, 94a  
 Salinas Valley: English, 18; Nutter, 01  
 San Benito Co., New Idria district: Bradley,  
 17a

## Geologic maps—Continued.

California: San Clemente Island: Smith (W S  
 T), 98  
 San Diego Co.: Hanks, 86  
 San Diego, Orange, and San Bernardino cos.:  
 Fairbanks, 93b  
 San Francisco Bay: Buckland, 39  
 San Francisco district: Lawson, 14  
 San Francisco Peninsula: Crandall (R), 07a;  
 Lawson, 95, 08  
 San Joaquin Valley: Anderson (R), 12; Dick-  
 erson, 15; (western border): Anderson  
 (R), 15  
 San Juan district: Anderson (F M), 14  
 San Luis quadrangle: Fairbanks, 04  
 San Luis Obispo and Kern cos.: McLaughlin  
 (R P), 15  
 San Luis Obispo Co.: Bagg, 05  
 San Luis Obispo district: Eldridge, 01  
 San Pablo group: Clark (B L), 15  
 Santa Ana Mountains: Dickerson, 14b; Paek-  
 ard (E L), 16  
 Santa Barbara Co., Point Sal: Fairbanks, 96a  
 Santa Catalina Island: Smith (W S T), 97  
 Santa Clara Valley: Eldridge, 07  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria oil district: Arnold, 07d, f  
 Sargent oil field: Jones (W F), 11  
 Shasta Co.: Fairbanks, 93; Prescott, 08a; Har-  
 rison Gulch: Kramm, 12  
 Sierra Nevada: Lindgren, 96b; Mills (J E), 92  
 Turner, 95, 96; (northern part): Lind-  
 gren, 11  
 Siskiyou Co., auriferous conglomerate: Dunn,  
 94  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora quadrangle: Turner, 97a  
 southern: Hershey, 02f; (part): Blake (W P);  
 57; artesian basins: Mendenhall, 09  
 Stanislaus River region: Ransome, 98  
 Summerland district: Arnold, 07e  
 Temblor Basin: Anderson (F M), 14  
 Tesla quadrangle: Anderson (R), 15  
 Trinity and Siskiyou cos.: MacDonald (D F),  
 13  
 Trinity Co.: Irelan, 90a  
 Truckee quadrangle: Lindgren, 97  
 Ventura and Los Angeles cos.: McLaughlin  
 (R P), 15  
 Weaverville quadrangle: Diller, 14; Fergu-  
 son, 14, 15  
 Cambrian: Walcott, 91  
 Canada: Can G S, 55, 82, 09, 12; Logan, 55, 63,  
 69; Marcou, 53, 55c, h; Roberts-Austen, 98;  
 Selwyn, 84  
 coal areas: Dowling, 13b  
 eastern: Adams (F D), 93  
 economic minerals: Can M Br, 13; Young  
 G A), 09  
 forty-ninth parallel: Dawson (G M), 75  
 iron ore occurrences: Lindeman, 17  
 northern: Dawson, 87a  
 southwestern: Hector, 61  
 western: Can G S, 01a; Haas, 04a  
 Canada and Newfoundland: Can G S, 13a  
 Cape Breton Island: Brown (R), 71  
 Catalog of geologic maps: Marcou (J), 84  
 Catoetin belt: Keith, 94a



## Geologic maps—Continued.

Cenozoic mammal horizons of western North America: Osborn, 09  
 Central America: Sapper, 05c; northern: Sapper, 99; southern: Sapper, 05a  
 Coal, eastern interior field: Ashley, 02; United States: Campbell (M R), 17a  
 Coal fields, Arizona-New Mexico, Arkansas-Oklahoma, Colorado-Utah, Illinois-Indiana-Kentucky (western), Iowa-Kansas-Missouri, Maryland-Virginia-West Virginia-Kentucky (eastern), Michigan, Montana-Wyoming-Idaho, North Dakota-South Dakota, Ohio, Pennsylvania, Tennessee - Georgia - Alabama, Texas, Washington: U S G S, 83 (1910)  
 Coal fields of Europe and America: Haliburton, 67  
 Colorado: George (R D), 13b; Hayden, 77c, 83a; U S G S Terr, 78; (part): White (C A), 82; (parts): Wheeler (G M), 76a  
 Alma district: Patton, 12  
 Anthracite-Crested Butte quadrangles: Eldridge, 94  
 Apishapa quadrangle: Stose, 12  
 Arkansas Valley: Darton, 06f  
 Aspen district: Spurr, 98  
 Baker's Pass and vicinity: Endlich, 75  
 Bassick Hill: Cross, 96  
 Bonanza district: Patton, 16  
 Book Cliffs coal field: Richardson (G B), 09b  
 Boulder Co.: George (R D), 09b; Sugarloaf district: Crawford (R D), 09  
 Boulder district: Fenneman, 05b  
 Canon City coal field: Lee (W T), 17; Washburne, 10a  
 Canon City embayment: Washburne, 09b  
 Castle Rock quadrangle: Richardson (G B), 15  
 Castle Rock region: Lee (W T), 02b  
 Cebolla district: Singewald, 12b  
 Central City region: Endlich, 74  
 coal and metalliferous areas: Dalzell, 11  
 Colorado Springs and vicinity: Hayden, 76  
 Colorado Springs coal field: Goldman, 10  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Cripple Creek district: Cross, 95; Hazelhurst, 00; Lakes, 05; Lindgren, 06d  
 Costilla Co., Grayback district: Patton, 10a  
 Danforth Hills quadrangle: Gale, 10  
 De Beque field: Woodruff, 13a  
 Crystal River district: Hills, 87a  
 Denver Basin: Emmons (S F), 96  
 Denver region: Cross, 89a  
 Denver-Colorado Springs region: Richardson (G B), 12  
 Eagle Co.: George (R D), 13a  
 Elk Mountains: Holmes (W H), 76  
 Elmore quadrangle: Hills, 99  
 Empire mining district: Spurr, 08  
 Engineer Mountain quadrangle: Cross, 10  
 Florissant lake basin: Scudder, 81  
 Georgetown quadrangle: Ball (S H), 08  
 Spurr, 08  
 glacial deposits: Atwood, 12a  
 Gold Brick district: Crawford (R D), 16

## Geologic maps—Continued.

Colorado: Golden area: Eldridge, 90  
 Grand Mesa coal field: Lee (W T) 09  
 Grand River valley: Peale, 78  
 Gunnison Co.: southeastern: Hill (J M), 09  
 Gunnison River region: Peale, 77  
 Jensen quadrangle: Gale, 10  
 Lake City district: Cross, 11  
 La Plata quadrangle: Cross, 99a  
 Leadville district: Emmons (S F), 82, 86  
 Leadville quadrangle, Pleistocene geology: Capps, 09  
 Manitou embayment: Crosby, 99b  
 Middle Park: Marvine, 74  
 Monarch and Tomichi districts: Crawford (R D), 13  
 Monarch district: Crawford (R D), 10  
 Montezuma district, Summit Co.: Patton, 09  
 Montrose quadrangle, glacial: Atwood, 15  
 Mount Lincoln region: Endlich, 74  
 Needle Mountains quadrangle: Cross, 05b  
 Nepesta quadrangle: Fisher (C A), 06a  
 north central: Henderson (J), 09  
 North Park: Beekly, 15  
 northwestern: Gale, 09; White (C A), 78d, 89  
 Ouray quadrangle: Cross, 07a  
 Pikes Peak sheet: Cross, 94  
 Platoro-Summitville district: Patton, 18  
 Pueblo quadrangle: Gilbert, 97  
 Rabbit Ears region: Grout 13a  
 Rangely quadrangle: Gale, 10  
 Rico Mountains: Cross, 00; Ransome, 01  
 Rico quadrangle: Cross, 05a  
 San Miguel region: Peale, 78  
 Silver Cliff and Rosita Hills: Cross, 96  
 Silverton quadrangle: Cross, 01, 05  
 South Park coal field: Washburne, 10  
 southeastern, laccolites: Gilbert, 96b  
 southern: Gardner, 09a; Stevenson, 81  
 southwestern: Comstock, 87  
 Spanish Peaks quadrangle: Hills, 01  
 Spanish Peaks region: Endlich, 77  
 Sugarloaf district, Boulder Co.: Crawford (R D), 09  
 Summit district, Rio Grande Co.: Hills, 85  
 Taylor Peak district: Harder, 09  
 Telluride quadrangle: Cross, 99; Purington, 98  
 Tenmile quadrangle: Emmons (S F), 98  
 Trinidad coal field: Richardson (G B), 10  
 Uinta Basin: Eldridge, 96  
 Unaweep Canyon: Peale, 77  
 Walsenburg quadrangle: Hills, 00  
 Whitepine district: Harder, 09  
 White River quadrangle: Gale, 10  
 Yampa River region: Hancock, 15  
 Colorado River: Newberry, 61  
 Columbia formation: McGee, 88, 91b  
 Connecticut: Dale, 11a; Ellis (E E), 06; Gregory (H E), 06a, 07a; Percival, 42; Rice (W N), 06  
 central: Barrell, 12; glacial: Loughlin, 05  
 Lighthouse granite: Ward (F), 09  
 Long Hill, tungsten area: Hobbs, 01a  
 Pomperaug Valley, Newark: Hobbs, 01  
 Salisbury: Hobbs, 93a  
 Triassic: Dana (J D), 91d; Davis (W M), 98  
 Windham and New London cos.: Mather, 34



## Geologic maps—Continued.

- Connecticut Valley: Hitchcock (E), 23; Smith (A), 32; Triassic area: Lull, 15  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Costa Rica (part): Attwood, 82  
 Cretaceous: Stephenson, 14; White (C A), 91a  
 Cuba: Fernández de Castro, 81; Hayes, 01; Hill (R T), 88e  
 Habana y Guanabacoa: Salterain y Legarra 80  
 Havana: Galeotti, 41  
 Oriente Province, Firmeza district: Roesler, 16  
 Santiago: Pellitero, 95  
 Curaçao: Martin (K), 88  
 Dakota: Hayden, 69b  
 Dakotas: Culver, 93  
 Delaware: Chester (F D), 84a  
 Cretaceous: Clark (W B), 97e  
 Dover quadrangle: Miller (B L), 06  
 gabbro area: Chester (F D), 90  
 District of Columbia: Darton, 01  
 Driftless Area, Upper Mississippi Valley: Chamberlin, 85a  
 Eocene: Clark (W B), 91  
 Florida: Dall, 90; Eckel, 13; Matson, 09b, 13a; Smith (E A), 81a; Vaughan, 10c  
 north central: Ulrich, 11a  
 peninsular portion: Matson, 15  
 phosphate deposits: Fla G S, 13  
 physiographic: Sellards, 12a  
 Tallahassee region: Sellards, 17a  
 western: Sellards, 18c  
 Fortieth parallel, Cordilleran region: King (C), 78a  
 Franklin: Low, 06; Hudson strait: Bell (R), 01  
 Georgia: Eckel, 13; Henderson (J T), 85; Little, 76a; McCallie, 01, 08, 10; McCutchin, 85; Veatch (J O), 09; Watson, 08; White, (G), 49  
 Appalachian Valley and Cumberland Plateau: Maynard, 12  
 Atlanta region: Purington, 94  
 Atlanta-Greenville: Campbell (J L), 83  
 bauxite: Watson, 04  
 Cartersville district: Watson, 04f  
 Coastal Plain: Brantley, 16; Cooke (C W), 18; Shearer, 17; Stephenson, 15a; Veatch (J O), 11a  
 Coosa Valley: Hayes, 94e; Watson, 01e  
 economic minerals: McCutchin, 85  
 fossil iron ores: Ball (S M), 09b  
 Ellijay quadrangle: LaForge, 13  
 gold deposits: McCallie, 97  
 Macon-Birmingham belt: Spencer (J W), 89  
 northern: Galpin, 15; Hopkins (O B), 14; King (F P), 94  
 northwestern: Ball (S M), 09b; McCallie, 04, 08a; Speneer (J W), 93  
 physiographic: Watson, 02  
 Polk, Bartow, and Floyd cos.: McCallie, 00  
 Ringgold sheet: Hayes, 94  
 Rome quadrangle: Hayes, 02  
 southwestern: McCallie, 98; Spencer (J W), 91a  
 Glacial epoch, second, terminal moraine: Chamberlin, 83b

## Geologic maps—Continued.

- Great Lakes region (part), glacial: Leverett, 02  
 Great Plains: Darton, 18; Hayden, 83a; northern: Hayden, 62  
 Greenland: Böggild, 17  
 Disco region: Brown (R), 75; Steenstrup, 74  
 eastern: Nordenskjöld, 09; Toula, 74  
 Julianehaab district: Jessen, 96; Steenstrup, 81; Ussing, 11  
 northeastern: Nathorst, 01  
 northern: Steenstrup, 93  
 Nugsuak Peninsula: Heim, 11  
 Scoresby Sound region: Bay, 96  
 southern: Laube, 73  
 Green River formation, Colo., Utah, and Wyo.: Winchester, 16a  
 Guatemala: Dollfus, 68  
 Alta Vera Paz: Sapper, 01a  
 Golfoastal region: Hager, 04; Hilgard, 71a, 81; Urbina, 18  
 Hayti: Tippenhauer, 99  
 Honduras, San Juaneita district: Leggett, 89  
 Idaho: Bell (R N), 06; (part): U S G S Terr, 83c  
 Alder Creek district: Umpleby, 14b  
 Boise Basin: Jones (E L), 16a  
 Boise quadrangle: Lindgren, 98  
 Boise region: Lindgren, 98a  
 central: Lindgren, 04b  
 Coeur d'Alene district: Ransome, 08  
 Custer Co.: Umpleby, 13b  
 Fort Hall mining district: Weeks, 08a  
 Mackay region: Umpleby, 17  
 Mullan: Calkins, 14  
 Nampa quadrangle: Lindgren, 04  
 Nez Perce region: Russell, 01  
 northern: Calkins, 09  
 phosphate deposits: Waggaman, 10  
 phosphate reserve: Richards (R W), 11b  
 St. Joe-Clearwater region: Calkins, 13a  
 Sawtooth quadrangle: Umpleby, 14a  
 Shoshone Co., upper St. Joe River basin: Pardee, 11  
 Silver City quadrangle: Lindgren, 04a  
 Soda Springs: Richards (R W), 11a  
 southeastern: Richards (R W), 14a; Schultz, 13; U S G S Terr, 83a, b  
 southern: Russell, 02a  
 Sublette Mountains: Gale, 10b  
 western central: Lindgren, 00a  
 Illinois: Bain, 06a; Eckel, 13; Ill G S, 12; Leverett, 96, 99, 05; Mead, 94b; Norwood, 57; Purdy, 07; Rolfe, 03; Weller, 06a, 08; Worthen, 75b, 90c  
 Belleville and Breese quadrangles: Udden, 15  
 Chicago area, glacial: Leverett, 97b  
 coal fields: Bement, 10  
 Colchester-Macomb quadrangles: Hinds, 17a  
 Cordova quadrangle: Carman, 09  
 Danville quadrangle: Campbell (M R), 00  
 fluor spar district: Bain, 05b  
 Galena and Elizabeth quadrangles: Cox (G H), 14; Trowbridge, 16  
 Galena-Elizabeth quadrangles: Shaw (E W), 16  
 glacial: Leverett, 99; Rolfe, 03



## Geologic maps—Continued.

Illinois: Glacial and soil map: Leverett, 95  
 Hardin Co.: Worthen, 66b  
 Herrin quadrangle: Savage, 10  
 Illinois Valley: Sauer, 16  
 Jo Daviess Co., Elizabeth sheet: Cox (G H), 10  
 La Salle Co.: Freeman (H C), 68  
 lead region: Whitney, 66c  
 Marion Co. oil fields: Blatchley (R S), 11  
 Millbrig district: Grant, 08  
 Murphysboro and Herrin quadrangles: Shaw (E W), 12b  
 Murphysboro quadrangle: Shaw (E W), 10a  
 north central: Cady, 18  
 northern: Mead (D W), 93  
 oil fields: Blatchley (R S), 10, 13  
 Patoka quadrangle, Fuller, 04  
 Peoria quadrangle: Udden, 12  
 Pleistocene: Leverett, 96  
 St. Louis area: Fenneman, 09  
 St. Louis quadrangle: Fenneman, 11  
 Savanna quadrangle: Carman, 09  
 Starved Rock State Park: Cady, 18  
 southwestern: Shaw (E W), 12  
 Tallula and Springfield quadrangles: Shaw (E W), 13a  
 West Frankfort: Shaw (E W), 15  
 West Frankfort quadrangle: Cady, 10  
 Wheaton quadrangle: Trowbridge, 12  
 zinc and lead region: Bain, 06  
 Indiana: Branner, 86d; Collett, 84, 84b; Eckel, 13; Gorby, 94, 94a; Hopkins (T C), 04c; Leverett, 97; Phinney, 91; Sayler, 65a  
 Attica sheet: Hopkins (T C), 96  
 Bartholomew Co.: Elrod, 82  
 Bedford area: Hopkins (T C), 97a  
 Bedford limestone region: Hopkins (T C), 97a  
 Bloomington area: Hopkins (T C), 97a  
 Bloomington quadrangle: Beede, 15  
 Borden region, Knobstone group: Jones (L H), 98  
 Brazil sheet: Hopkins (T C), 96  
 Brown Co.: Collett, 75  
 Clark and Floyd cos.: Borden, 74  
 Clay Co.: Cox (E T), 69  
 coal regions: Ashley, 99  
 Crawford Co.: Collett, 79  
 Danville quadrangle: Campbell (M R), 00  
 Dearborn Co.: Bigney, 16  
 Dearborn, Ohio, and Switzerland cos.: Warder, 72  
 Delaware Co.: Phinney, 82  
 Ditney quadrangle: Fuller, 02  
 Dubois Co.: Collett, 72  
 Fountain Co.: Brown (R T), 82  
 glacial: Leverett, 97a, 15  
 Greene Co.: Cox (E T), 69  
 Harrison Co.: Collett, 79  
 Jackson Co.: Cox (E T), 75  
 Jefferson Co.: Borden, 75a  
 Knobstone group: Newsom, 03  
 Lake and Porter Cos.: Blatchley (W S), 98a  
 Lawrence Co.: Collett, 74a  
 Monroe Co.: Greene (G K), 80; Reagan, 04  
 Montgomery Co.: Collett, 76  
 natural gas map: Gorby, 89a

## Geologic maps—Continued.

Indiana: New Albany region: Newsom, 98b  
 northeastern, glacial drift: Dryer, 94a  
 north central: Capps, 10b  
 Owen Co.: Collett, 76  
 Paoli sheet: Kindle, 96a  
 Parke Co.: Hobbs (B C), 72  
 Patoka quadrangle: Fuller, 04  
 Perry Co.: Cox (E T), 72  
 petroleum: Blatchley (W S), 97a  
 Pike Co.: Collett, 72a  
 Pleistocene: Leverett, 97, 99a  
 Putnam Co.: Collett, 80a  
 Scott Co.: Borden, 75  
 Shelby Co.: Collett, 82a  
 southeastern: Siebenthal, 01  
 southern, Mississippian: Ashley, 03  
 Sullivan Co.: Collett, 71  
 Trenton, hypsographic: Phinney, 91  
 Vanderburgh Co.: Collett, 76  
 Vermilion Co.: Bradley, 69  
 Vigo Co.: Cox (E T), 76  
 Waldron shale: Price, 00  
 Warren Co.: Collett, 74  
 Wayne Co.: Cox (E T), 79  
 Iowa: Calvin, 93c; Eckel, 13; Hall, 58; Iowa G S, 14; Kay, 14b; Keyes, 93a, 94, 94a, 95; Lees, 16; Norton, 12; Savage, 06b, 07; White (C A), 70  
 Allamakee Co.: Calvin, 95a  
 Appanoose Co.: Bain, 96c  
 Benton Co., surface deposits: Savage, 05a  
 Black Hawk Co.: Arey, 06  
 Boone Co.: Beyer, 96  
 Buchanan Co.: Calvin, 98a  
 Buena Vista Co., surface deposits: MacBride, 02  
 Butler Co.: Arey, 10  
 Bremer Co.: Norton, 06  
 Carroll Co., surface deposits: Bain, 99a  
 Cedar Co.: Norton, 01; surface deposits: Norton, 01  
 Cerro Gordo Co.: Calvin, 97a; surface deposits: Calvin, 97a  
 Cherokee Co., surface deposits: MacBride, 02  
 Chickasaw Co.: Calvin, 03a  
 Clay Co., surface deposits: MacBride, 01  
 Clayton Co.: Leonard, 06  
 Clinton Co.: Udden (Jon A), 05; surface deposits: Udden (Jon A), 05  
 Cordova quadrangle: Carman, 09  
 Dallas Co.: Leonard, 98; surface deposits: Leonard, 98  
 Davis Co.: Arey, 10c  
 Decatur Co.: Bain, 98a  
 Delaware Co.: Calvin, 98  
 Des Moines Co.: Keyes, 95d  
 Dickinson Co., surface deposits: MacBride, 00  
 drift sheets: Bain, 98d, 04i; Iowa G S, 14a  
 Dubuque Co.: Calvin, 00; surface deposits: Calvin, 00  
 economic: Parker (N H), 56  
 Emmet Co., surface deposits: MacBride, 05  
 Fayette Co.: Savage, 05b; surface deposits: Savage, 05b  
 Franklin Co.: Williams (I A), 06  
 Fremont Co., surface deposits: Udden, 03



## Geologic maps—Continued.

Iowa: Galena quadrangle: Shaw, 16  
 Grundy Co.: Arey, 10a  
 Guthrie Co.: Bain, 97c; surface deposits: Bain, 97c  
 gypsum region: Keyes, 95b; Fort Dodge: Wilder, 02  
 Hamilton Co.: MacBride, 10  
 Hancock Co., surface deposits: MacBride, 03  
 Hardin Co.: Beyer, 00  
 Harrison Co.: Shimek, 10  
 Henry Co.: Savage, 02  
 Howard Co.: Calvin, 03; surface deposits: Calvin, 03  
 Humboldt, surface deposits: MacBride, 99  
 Iowa Co.: Stookey, 10  
 Jackson Co.: Savage, 06a  
 Jasper Co.: Williams (I A), 05; surface deposits: Williams (I A), 05  
 Jefferson Co.: Udden, 02  
 Jones Co.: Calvin, 96  
 Johnson Co.: Calvin, 97; surface deposits: Calvin, 97  
 Keokuk Co.: Bain, 95c  
 Kossuth Co., surface deposits: MacBride, 03  
 Lancaster quadrangle: Grant (U S), 07  
 Lee Co.: Keyes, 95c  
 Linn Co.: Norton, 95b  
 Louisa Co.: Udden, 01; surface formations: Udden, 01  
 Lyon Co., surface deposits: Wilder, 00  
 Madison Co.: Tilton, 97  
 Mahaska Co.: Bain, 95d  
 Marion Co.: Miller (B L), 01  
 Marshall Co.: Beyer, 97a; surface deposits: Beyer, 97a  
 Mills Co., surface deposits: Udden, 03  
 Mitchell Co.: Calvin, 03b  
 Monona Co.: Shimek, 10  
 Monroe Co.: Beyer, 03  
 Montgomery Co.: Lonsdale, 95  
 Muscatine Co.: Udden, 99; surface deposits: Udden, 99  
 northeastern: McGee, 91; superficial formations: McGee, 91  
 northwestern, Pleistocene: Carman, 17  
 O'Brien Co., surface deposits: MacBride, 01  
 Osceola Co., surface deposits: MacBride, 00  
 Page Co.: Calvin, 01  
 Palo Alto Co., surface deposits: MacBride, 05  
 Pleistocene: Alden, 17  
 Plymouth Co.: Bain, 98b  
 Pocahontas Co., surface deposits: MacBride, 05  
 Polk Co.: Bain, 97b; surface deposits: Bain, 97b  
 Pottawatamie Co., surface deposits: Udden, 01a  
 Poweshiek Co.: Stookey, 10a  
 Sac and Ida cos.: MacBride, 06  
 Savanna quadrangle: Carman, 09  
 Scott Co.: Norton, 99; surface deposits: Norton, 99  
 Sioux Co., surface deposits: Wilder, 00  
 Story Co.: Beyer, 99b  
 Tama Co., surface deposits: Savage, 03  
 Van Buren Co.: Gordon (C H), 95a

## Geologic maps—Continued.

Iowa: Wapello Co.: Leonard, 02  
 Warren Co.: Tilton, 96  
 Washington Co.: Bain, 96a  
 Waukon area: Howell (J V), 16  
 Wayne Co.: Arey, 10b  
 Webster Co.: Wilder, 02  
 Winnebago Co., surface deposits: MacBride, 03  
 Winneshiek Co.: Calvin, 06  
 Woodbury Co.: Bain, 96b  
 Worth Co.: Williams (I A), 00; surface deposits: Williams (I A), 00  
 Wright Co.: MacBride, 10  
 zinc and lead region: Bain, 06  
 Iowa, Wisconsin, and Illinois (part): Owen (D D), 40  
 Isthmus of Tehuantepec: Spear, 72  
 Jamaica: Hall (M), 13; Hill (R T), 99; Sawkins, 69; Clarendon district: Duncan, 65  
 Kansas: Crane, 01; Eckel, 13; Haworth, 96, 97c, 08b, 13; Hay (R), 93a; Moore (R C), 17; Mudge, 75b; Parker (H N), 11; St. John, 83c; Williston, 95a, 99e  
 Blue Valley: Beede, 00b  
 Camp Funston region: Moore (R C), 18  
 Cottonwood Falls quadrangle: Prosser, 04  
 gas and oil fields: Adams (G I), 01a  
 Independence quadrangle: Schrader, 06a, 08  
 Iola quadrangle: Adams (G I), 04c  
 Joplin district: Smith (W S T), 07a  
 Leavenworth quadrangle: Hinds, 17  
 Logan and Gove cos.: Adams (G I), 98a  
 McPherson Co.: Udden, 91  
 McPherson and Saline cos.: Beede, 98a  
 McPherson and vicinity: Haworth, 97c  
 middle western: Adams (G I), 97a  
 Norton Co.: Hay (R), 85  
 Ozark region: Adams (G I), 01  
 Reading blue limestone: Smith (A J), 05  
 southeastern: Adams (G I), 03  
 southwestern: Haworth, 97; Hay (R), 90  
 Kentucky: Chauvenet, 86; Eckel, 13; Eldridge, 01; Hoeing, 07; Orton, 91; Procter, 87; Saylor, 65b; Sellier, 17; Shaler, 76b  
 Bath and Fleming cos.: Linney, 86  
 Big Stone Gap coal field: Campbell (M R), 93  
 Blue Grass region: Matson, 09  
 Boyle and Mercer cos.: Linney, 83b  
 Calhoun quadrangle: Hutchinson, 12  
 Central City quadrangle: Hutchinson, 12  
 Clark and Montgomery cos.: Linney, 85  
 Clinton Co.: Loughridge, 90  
 Cumberland Gap coal field: Ashley, 06  
 Dawson Springs quadrangle: Crider, 14  
 Drakesboro quadrangle: Crider, 15a  
 Dunmore quadrangle: Crider, 15b  
 Earlington quadrangle: Crider, 14a  
 east central: Foerste, 06  
 eastern: Miller (A M), 10  
 Elkhorn district: Stone (R W), 08  
 Elliott Co.: Crandall, 87a  
 fluorite district: Ulrich, 05  
 Garrard Co.: Linney, 83  
 Georgetown quadrangle: Miller (A M), 17a  
 Henry, Shelby, and Oldham cos.: Linney, 87  
 Jackson and Rockcastle cos.: Sullivan, 91



## Geologic maps—Continued.

- Kentucky: Jefferson Co.: Butts, 15  
 Kenova quadrangle: Phalen, 12  
 Lincoln Co.: Linney, 83a  
 Little Muddy quadrangle: Crider, 15c  
 London quadrangle: Campbell (M R), 98a  
 Madisonville quadrangle: Hutchinson, 12  
 Mason Co.: Linney, 86a  
 Newburg quadrangle: Hutchinson, 12  
 northeastern: Munn, 13; Shaw (E W), 17  
 Nortonville quadrangle: Crider, 15  
 Pound quadrangle: Butts, 14  
 Richmond quadrangle: Campbell (M R), 98  
 Shawneetown quadrangle: Lee (W), 16  
 Spencer and Nelson cos.: Linney, 84  
 Warren Co.: Hoeing, 91  
 Washington and Marion cos.: Knott, 85; Linney, 83c  
 western: Butts, 17b; Ulrich, 05; lead region: Norwood, 76a; Jackson Purchase: Loughridge, 88  
 Whitley Co.: Crandall, 91  
 Labrador: Daly, 02a; Grenfell, 09  
 Lafayette formation: McGee, 91b  
 Lake Superior region: Brinsmade, 08g; Clements, 99; Irving, 83b, c, 85a, 90, 92; Leith, 05a; Van Hise, 93a, b, 01, 11; Whittlescy, 76; north shore: Nicholson, 75m  
 Lead region, Wisconsin, Illinois and Iowa: Whitney, 62  
 Louisiana: Harris, 99a; Hopkins (F V), 71, 72; Matson, 17; Veatch (A C), 06e, g  
 Caddo oil and gas field: Matson, 16b  
 iron districts: Johnson (L C), 88  
 Natchitoches area: Harris (G D), 99b  
 Sabine River region: Veatch (A C), 02a  
 Winnfield sheet: Harris (G D), 07  
 Louisiana-Texas salines: Harris (G D), 09  
 Maine: Hitchcock (C H), 85; part: Bastin, 10  
 Aroostook Co.: Gregory (H E), 00; volcanic area: Williams (H S), 16  
 Blue Hill area: Emmons (W H), 10a  
 Boothbay quadrangle: Ogilvie, 07  
 Casco Bay: Lord, 98  
 Eastport quadrangle: Bastin, 14  
 Fox Islands: Smith (G O), 96, 02a  
 Monhegan Island: Lord, 00a  
 Mount Desert Island: Shaler, 89a  
 northern: Hitchcock (C H), 61a, 62a  
 northwestern: Hitchcock (C H), 74h  
 Penobscot Bay quadrangle: Smith (G O), 07d  
 Perry district: Smith (G O), 05  
 Portland: Hitchcock (E), 36b  
 Rockland quadrangle: Bastin, 08a  
 Somerset Co.: Clarke (J M), 09a  
 southern: Clapp (F G), 09; Hitchcock (C H), 62; Leighton, 08  
 southwestern: Katz, 17a  
 Manitoba: Bryce, 07; Hind, 59; McInnes, 13a; Malcolm, 13; Ries, 12c  
 Big Clearwater Lake region: Dresser (J A), 17  
 coal area: Dowling, 09b, 13b  
 Dawson Bay: MacLean (A), 13  
 Lake Agassiz: Upham, 90  
 Lake Winnipeg region: Dowling, 95, 00a; Moore (E S), 14; Tyrrell, 00

## Geologic maps—Continued.

- Manitoba: Lake Winnipeg-Burntwood River region: Dowling, 02; Tyrrell, 02  
 Schist Lake district: Bruce, 17  
 western: Tyrrell, 92  
 Wekusko Lake area: Bruce, 17  
 Winnipeg to Malachi: Collins (W H), 13b  
 Martinique: Giraud, 18  
 Maryland: Clark (W B), 97b, 06c; Eckel, 13; Md G S, 07; Tyson, 60  
 Accident and Grantsville quadrangles: Martin (G C), 08a  
 Allegany Co.: Clark (W B), 00  
 Anne Arundel Co.: Little, 17  
 Baltimore area: Darton, 92a; Williams (G H), 92a  
 Baltimore Co.: Mathews, 05a  
 Calvert Co.: Shattuck, 07  
 Cecil Co.: Clark (W B), 02; Leonard, 01a  
 Choptank quadrangle: Miller (B L), 12  
 clays: Ries, 02a  
 coal measures: Clark (W B), 02c, 05a  
 Cretaceous: Clark (W B), 97c  
 Devonian: Swartz, 13  
 Dover quadrangle: Miller (B L), 06  
 eastern: Darton, 91b  
 Eocene: Clark (W B), 01  
 Garrett Co.: Clark (W B), 02a  
 Georges Creek coal basin: Clark (W B), 05b  
 Harpers Ferry quadrangle: Keith, 94  
 Lower Cretaceous: Clark (W B), 11  
 Nomini quadrangle: Darton, 96a  
 Patuxent quadrangle: Shattuck, 07c  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 physiographic: Clark (W B), 99  
 Piedmont Plateau: Mathews, 04, 07  
 Piedmont quadrangle: Darton, 96b  
 Potomac formation: Fontaine, 96  
 Potomac group: Clark (W B), 02b  
 Prince Georges Co.: Miller (B L), 11  
 St. Marys Co.: Shattuck, 07a  
 St. Marys quadrangle: Shattuck, 06a  
 Tolchester quadrangle: Miller (B L), 17  
 Upper Cretaceous: Clark (W B), 16  
 Washington quadrangles: Darton, 01  
 Massachusetts: Emerson (B K), 17; Hitchcock (C H), 71d; Hitchcock (E), 32, 32a, 33, 41, 44a; Loughlin, 14b; Mansfield, 06a  
 Berkshire Co.: Dewey, 29; Emerson (B K), 99  
 Boston area: Dana (J F), 18  
 Boston Basin: Crosby, 93; Lake Bouvé: Grabau, 00  
 Boston Harbor and Charles River estuary: Crosby, 03  
 Boston region: Crosby, 80  
 Bristol Co.: Shaler, 88a  
 Cape Ann: Shaler, 89b  
 Charles River: Clapp (F G), 01  
 coal field: Hitchcock (E), 53a  
 Connecticut Valley: Hitchcock (E), 58; surface geology: Hitchcock (E), 57  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 eastern: Crosby, 80; Loughlin, 11  
 Essex Co.: Sears, 05; Washington, 98



## Geologic maps—Continued.

- Massachusetts: Greylock and Hoosac mountains: Pumpelly, 94  
 Hampshire Co.: Emerson (B K), 98  
 Hingham: Crosby, 94  
 Holyoke quadrangle: Emerson (B K), 98a  
 Hoosac Mountain: Wolff (J E), 94  
 Marthas Vineyard: Shaler, 88  
 Medford area: Wilson (A W G), 01a  
 Monument Mountain, Berkshire Co.: Dale, 94b  
 Mount Washington: Hobbs, 93  
 Nantasket district: Crosby, 93  
 Nantucket Island: Shaler, 89c  
 Narragansett basin: Ashley, 14; Shaler, 99  
 Nashua Valley: Crosby, 99a  
 Rensselaer grit plateau: Dale, 93  
 Sheffield: Hobbs, 93a  
 western: Dewey, 24; Walling, 79a  
 Worcester area: Perry (J H), 03  
 Mexico: Aguilera, 94, 06a; Castillo, 89a, 93; Iglesias, 18  
 Aguascalientes: Bárcena, 76  
 Cerro de Muleros: Böse, 10  
 Chiapas and Tabasco: Böse, 05; Sapper, 96, 96a  
 Chihuahua: Hill (R T), 07d; Hovey, 07a; (part): Burrows (R H), 10; Sierra Rica district: Phillips (W B), 05a  
 Durango, El Oro district: Roldán, 11  
 eastern: Burrows (R H), 10a  
 Guanajuato district: Botsford, 09; Villarello 09g  
 Hidalgo: Bárcena, 77b  
 Isthmus of Tehuantepec: Barroso, 77  
 Jalisco: Bárcena, 91  
 Lower California, La Paz: Angermann, 04  
 Mapimi: Angermann, 07a  
 Mexico (State): Gerolt, 27d  
 Mexico and Toluca valleys: Villada, 91  
 Mexico to Popocatepetl: Aguilera, 95  
 mining districts: Egloffstein, 64  
 oil fields: Huntley, 15  
 Queretaro: Paredes, 09a; Villarello, 05d; Cadereyta Mendez: Villarello, 04c  
 San Pedro de Gallo: Angermann, 07  
 Sierra de Concepcion del Oro: Burckhardt, 06a  
 Sinaloa: Weidner, 84  
 Sonora, Moctezuma region: Aguilera, 88  
 Tamaulipas, San Jose district: Finlay (G I), 04; Kemp, 05  
 Tlahualilo: Villarello, 10  
 Tlalpujahua: Burkart, 69  
 Yucatan Peninsula: Sapper, 96  
 Zacatecas: Burckhardt, 06; Burkart, 36; Rice (C T), 08e; Villafañá, 12  
 Zomelahuacan district: Dollfus, 67b  
 Michigan: Allen (R C), 16; Eckel, 13; Lane, 02d, g, 08a; Leith, 15b; Leverett, 06b, 15; Russell, 02, 05a; Smith (R A), 14, 16; Winchell (A), 64d, 73a; Wright (F E), 05  
 Alcona Co., surface formations: Leverett, 02a  
 Ann Arbor quadrangle: Russell (I C), 08  
 Arenac Co.: Gregory (W M), 12  
 Black River section: Gordon (W C), 07  
 Calumet district: Van Hise, 11

## Geologic maps—Continued.

- Michigan: Coal field: Lane, 02h  
 Crystal Falls district: Clements, 99; Van Hise, 11  
 Cuyuna district: Van Hise, 11  
 Dead River area: Van Hise, 11  
 Detroit district: Sherzer, 17  
 Gogebic iron range: Allen (R C), 15, 15a  
 Gwinn iron district: Allen (R C), 14d  
 Huron Co.: Lane, 00; surface geology: Lane, 00  
 Iron River district: Allen (R C), 09b, 10; Van Hise, 11  
 Isle Royale: Foster, 49a, 50a; Jackson, 49; Lane, 98, 11a  
 Keweenaw Point: Foster, 49a, 50a; Hubbard (L L), 98; Irving, 85; Jackson, 49; Stevens, 63; Van Hise, 11; Whitney, 53a  
 Lake Superior mineral district: Booth, 55  
 Lake Superior region: Burt, 49; Foster, 49a, 51, 51b; Koch (F C L), 52  
 Lapeer Co., surface formations: Taylor (F B), 02  
 Lower Peninsula: Lane, 95, 99, 99a, 05g; Rominger, 76  
 Marquette district: Van Hise, 95, 97, 11  
 Marquette region: Rominger, 81; Williams (G H), 90  
 Menominee district: Bayley, 04  
 Menominee, Dickinson, and Iron cos.: Russell, 07  
 Menominee district: Van Hise, 01, 11  
 Menominee iron region: Van Hise, 93a  
 Menominee quadrangle: Van Hise, 00  
 Menominee Range: Hulst, 93  
 Menominee region: Williams (G H), 90  
 Michigamme district: Clements, 95  
 Monroe Co.: Sherzer, 00  
 Mount Bohemia: Wright (F E), 09b  
 Northern Peninsula: Leverett, 11  
 northern shores of lakes Huron and Michigan: surface geology: Russell, 05a  
 Ontonagon Co., Rockland and Pewabic townships: Broughton, 63  
 Penoque region: Irving, 90  
 Penoque-Gogebic iron region: Van Hise, 93a, 01, 11  
 Penoque series: Irving, 92  
 Porcupine Mountains: Wright (F E), 09c  
 Republic Trough: Van Hise, 95  
 Sanilac Co.: Gordon (C H), 00  
 southern Peninsula, surface formations: Leverett, 12  
 surface geology: Leverett, 17  
 Upper Peninsula: Mosler, 77; (part): Allen (R C), 15  
 Wayne Co.: Sherzer, 13  
 Michigan and Wisconsin, iron region: Putnam, 86  
 Minnesota: Kloss, 71; Winchell (N H), 73a, 95, 01  
 Aitkin Co.: Upham, 99  
 Akeley Lake plate: Grant (U S), 99  
 Becker Co.: Upham, 88  
 Beltrami Co.: Todd, 99a  
 Benton and Sherburne cos.: Upham, 88  
 Bigstone and Lac qui Parle cos.: Upham, 84  
 Blue Earth Co.: Upham, 84



## Geologic maps—Continued.

Minnesota: Brown and Redwood cos.: Upham, 84  
 Carlton Co.: Winchell (N H), 99a  
 Carlton plate: Winchell (N H), 99a  
 Carver and Scott cos.: Upham, 88  
 Cass Co.: Upham, 99  
 centraleastern: Hall (C W), 01a  
 Chisago, Isanti, and Anoka cos.: Upham, 88  
 Clay Co.: Upham, 88  
 Cook Co.: Grant (U S), 99  
 Cottonwood and Jackson cos.: Upham, 84  
 Crow Wing and Morrison cos.: Upham, 88  
 Dakota Co.: Winchell (N H), 88a  
 Dodge Co.: Harrington (M W), 76, 84  
 Douglas and Pope cos.: Upham, 88  
 Duluth plate: Winchell (N H), 99a  
 Dunka River plate: Winchell (N H), 99a  
 east central: Harder, 18  
 eastern: Grout, 10a  
 Fargo quadrangle: Hall (C M), 05  
 Faribault Co.: Upham, 84  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Fraser Lake plate: Grant (U S), 99  
 Freeborn Co.: Winchell (N H), 75b, 84a  
 Gabbro Lake plate: Grant (U S), 99  
 Goodhue Co.: Winchell (N H), 88a  
 Grand Rapids plate: Grant (U S), 99  
 Grant and Stevens cos.: Upham, 88  
 Gunflint Lake plate: Grant (U S), 99  
 Hennepin Co.: Winchell (N H), 77b, 88a  
 Hibbing plate: Winchell (N H), 99a  
 Houston Co.: Winchell (N H), 77a, 84a  
 Hubbard Co.: Todd, 99a  
 iron regions: Winchell (N H), 91  
 Itasca Co.: Grant (U S), 99  
 Kandiyohi and Meeker cos.: Upham, 88  
 Kekequabic Lakeregion: Grant (U S), 93a  
 Keweenawan: Hall (C W), 01  
 Lake Co.: Winchell (N H), 99a  
 Le Sueur Co.: Upham, 84  
 McLeod Co.: Upham, 88  
 Marshall, Roseau, and Kittson cos.: Todd, 99a  
 Mesabi district: Leith, 03; Van Hise, 01, 11  
 Mesabi iron range: Winchell (N H), 99a  
 Mesabi range: Grant (U S), 98  
 Mille Lacs and Kanabec cos.: Upham, 88  
 Minneapolis-St. Paul district: Sardeson, 16  
 Mountain iron plate: Winchell (N H), 99a  
 Mountain Lake plate: Grant (U S), 99  
 Mower Co.: Winchell (N H), 75c, 84a  
 Murray and Nobles cos.: Upham, 84  
 Norman and Polk cos.: Todd, 99a  
 northeastern: Winchell (A), 87; Winchell (A N), 00; Keweenawan area: Elftman, 98; surface formations: Leverett, 17a  
 northern, glacial geology: Upham, 94  
 Olmsted Co.: Harrington (M W), 76, 84  
 Otter Tail Co.: Upham, 88  
 Partridge River plate: Winchell (N H), 99a  
 Pigeon Point: Bayley, 93  
 Pigeon Point district: Van Hise, 11  
 Pigeon Point plate: Winchell (N H), 99a  
 Pine Co.: Upham, 88  
 Pipestone and Rock cos.: Winchell (N H), 84a  
 Pokagama Lake plate: Grant (U S), 99  
 Rainy Lake region: Winchell (H V), 99

## Geologic maps—Continued.

Minnesota: Ramsey Co.: Winchell (N H), 78c, 88a  
 Redstone region: Sardeson, 08a  
 Renville Co.: Upham, 88  
 Rice Co.: Sperry, 78; Winchell (N H), 84a  
 Rove Lake plate: Grant (U S), 99  
 Saint Anthony Falls region: Winchell (N H), 77b  
 St. Croix Dalles: Berkey, 97  
 St. Louis Co.: Winchell (N H), 99a  
 St. Paul-Minneapolis region: Emmons (S F), 93  
 Sibley and Nicollet cos.: Upham, 88  
 Snowbank Lake plate: Grant (U S), 99  
 southeastern: Hall (C W), 92  
 southwestern: Hall (C W), 99, 11a  
 Stearns Co.: Upham, 88  
 Steele Co.: Harrington (M W), 76, 84  
 surface formations: Leverett, 14a, 15a, 16  
 Swan Lake plate: Grant (U S), 99  
 Swift and Chippewa cos.: Upham, 88  
 Vermilion district: Clements, 03; Van Hise, 01, 11  
 Vermilion Lake plate: Winchell (N H), 99a  
 Vermilion Lake region: Willis, 86c  
 Vermilion range: Winchell (N H), 87  
 Virginia plate: Winchell (N H), 99a  
 Wabasha Co.: Winchell (N H), 88a  
 Wadena and Todd cos.: Upham, 88  
 Washington Co.: Winchell (N H), 88a  
 Watonwan and Martin cos.: Upham, 84  
 Wilkin and Traverse cos.: Upham, 88  
 Winona Co.: Winchell (N H), 84a  
 Wright Co.: Upham, 88  
 Yellow Medicine, Lyon, and Lincoln cos.: Upham, 84  
 Mississippi: Brown (C S), 07; Crider, 06, 06b; Eckel, 13; Harper, 57; Hilgard, 60; Johnson (L C), 05; Lieber, 54; Logan, 05a; Lowe, 15  
 Greenville-Atlanta: Campbell (J L), 83  
 Oktibbeha Co.: Logan, 04a  
 Tombigbee Valley: Eckel, 05h  
 western: Wade, 17  
 Mississippi embayment: Harris (G D), 02a; Hilgard, 72; Little, 82  
 Mississippi River to Pacific Ocean, thirty-fifth parallel: Blake (W P), 56a  
 Mississippi Valley, upper: Mead (D W), 94  
 Missouri: Buckley, 03a, 04; Crane (G W), 12; Eckel, 13; Hinds, 15; Keyes, 96b; Marbut, 04; Mo B G, 12; Nason, 92; Shepard, 05a, 07; Swallow, 73  
 barite districts: Tarr (W A), 18  
 Barton Co.: Broadhead, 74  
 Bates Co.: Broadhead, 74  
 Bevier sheet: Gordon (C H), 93  
 Boone Co.: Broadhead, 98  
 Calhoun sheet: Marbut, 98  
 Cape Girardeau Co.: Shumard (B F), 73  
 Cedar Co.: Broadhead, 74  
 central lead and zinc district: Winslow, 94  
 Clark Co.: Shumard (B F), 73  
 Clinton sheet: Marbut, 98  
 coal measures: Winslow, 91a  
 Cooper Co.: Swallow, 55b  
 Crawford Co., Wesco area: Hughes, 11



## Geologic maps—Continued.

- Missouri: Drift and loess: Todd, 96a  
 economic: Parker (N H), 65  
 Franklin Co.: Shumard (B F), 55  
 Granby area: Buckley, 06  
 Greene Co.: Shepard, 98  
 Higginsville sheet, Lafayette Co.: Winslow, 92, 92a  
 Howard Co.: Broadhead, 74  
 Huntsville quadrangle: Marbut, 98  
 Jackson Co.: McCourt, 17  
 Jasper Co.: Broadhead, 74  
 Jefferson Co.: Shumard (B F), 73  
 Joplin district: Smith (W S T), 07a  
 Kansas City: McCourt, 17  
 Leavenworth quadrangle: Hinds, 17  
 Lexington sheet: Marbut, 98  
 Madison Co.: Broadhead, 74  
 Marion Co.: Swallow, 55b  
 Miller Co.: Ball (S H), 03; Meek, 73c  
 Mine la Motte sheet: Keyes, 95h  
 Moniteau Co.: Meek, 55; Van Horn (F B), 05  
 Morgan Co.: Marbut, 08; Meek, 73c  
 northeastern: Greene (F C), 14  
 Ozark Co.: Shumard (B F), 73  
 Ozark region: Adams (G I), 01; Buehler, 17  
 Pennsylvanian series: Hinds, 15  
 Phelps Co., Newburg area: Lee (W), 11  
 Pike Co.: Rowley, 08  
 Pilot Knob: Pumpelly, 73a  
 Pulaski Co.: Shumard (B F), 73  
 Richmond quadrangle: Marbut, 98  
 Rolla quadrangle: Lee (W), 14  
 Ste. Genevieve Co.: Shumard (B F), 73  
 St. Louis area: Fenneman, 09  
 St. Louis Co.: Ladd, 90a; Shumard (B F), 55  
 St. Louis quadrangle: Fenneman, 11  
 Smithville quadrangle: Hinds, 17  
 southeastern: Buckley, 09; Phillips, 59; Winslow, 96; lead and zinc district: Winslow, 94  
 Southwest Pacific Railroad line: Swallow, 59a  
 southwestern lead and zinc district: Winslow, 94  
 Vernon Co.: Broadhead, 74  
 Wright Co.: Shumard (B F), 73  
 Missouri River region: Hayden, 57; Meek, 58b  
 Montana: Calhoun, 06; Darton, 06b; Hayden, 83a; Mortson, 92; (part): Hayden, 72a  
 Baker field, Custer Co.: Bowen (C F), 12  
 Big Horn Mountains region: Darton, 06e  
 Big Sandy field: Bowen (C F), 14b  
 Birch Creek-Sun River region: Stebinger, 18  
 Blackfeet Indian Reservation: Stebinger, 17a  
 Boulder batholith: Billingsley, 15  
 Bowdoin dome: Collier, 17  
 Bull Mountain coal field: Richards (R W), 09; Rowe, 15a; Woolsey, 09, 17  
 Butte district: Weed, 97, 12  
 Cascade Co., Hound Creek district: Barnett, 16  
 Castle Mountains district: Weed, 96a  
 central: Bowen (C F), 15  
 Cleveland field: Bowen (C F), 14a  
 coal fields: Stebinger, 13a  
 Crazy Mountains: Stone (R W), 09  
 Culbertson field, Valley Co.: Beekly, 12  
 Custer Co., Terry lignite field: Herald, 12

## Geologic maps—Continued.

- Montana: Custer National Forest: Wegemann, 09a  
 Dawson Co., Glendive lignite field: Hance, 12  
 Dillon quadrangle (parts): Winchell (A N), 14  
 eastern: Calvert, 12  
 Electric coal field, Park Co.: Calvert, 12b  
 Elkhorn district, Jefferson Co.: Weed, 01  
 Elkhorn Mountains: Stone (R W), 11  
 Elliston field: Stone (R W), 14  
 Fort Benton quadrangle: Weed, 99  
 Fort Peck Indian Reservation lignite field: Smith (C D), 09b  
 Garnet Range: Pardee, 18  
 Garrison phosphate field: Pardee, 17  
 Glacier National Park, Pleistocene: Alden, 12, 13, 14  
 Great Falls region: Fisher (C A), 09, 09a  
 Helena region: Knopf, 13; Walcott, 14  
 Highwood Mountains: Pirsson, 05; Weed, 95a  
 Judith Mountains: Weed, 98  
 Judith River region: Hayden, 59a  
 Lake Basin field: Hancock, 17  
 Lewiston coal field: Calvert, 09, 09a  
 Little Belt Mountains: Weed, 99a, 00  
 Little Bitterroot Valley: Meinzer, 16  
 Little Rocky Mountains: Weed, 96b  
 Livingston and Trail Creek coal fields: Calvert, 12a  
 Livingston quadrangle: Iddings, 94  
 Livingston region: Stone (R W), 10; Weed, 93a  
 Miles City coal field: Collier, 09a  
 Milk River coal field: Pepperberg, 09a  
 Musselshell Valley: Bowen (C F), 18e  
 Musselshell-Judith area: Bowen (C F), 14  
 northeastern: Collier, 18, 18a  
 northwestern: Calkins, 09  
 Park Co.: Emmons (W H), 08  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 13b  
 Red Lodge coal field: Woodruff, 09  
 Rosebud Co., Porcupine dome: Bowen (C F), 15a  
 Saltese: Calkins, 14  
 Sentinel Butte lignite field: Leonard, 09  
 Sheridan Co.: Bauer, 14a  
 Sidney field, Dawson Co.: Stebinger, 12  
 southwestern: Pardee, 13a  
 Stillwater Basin: Calvert, 16  
 Teton Co.: Stebinger, 16  
 Three Forks quadrangle: Peale, 96  
 Three Forks region: Haynes, 16a; Peale, 93  
 Navajo country: Gregory (H E), 17  
 Nebraska: Harbour, 95b, 03; Carmony, 03; Condra, 08a; Darton, 99a, 03b; Gould, 01; Hayden, 89b; Hicks, 89, 90a; Pepperberg (R V), 10  
 Camp Clarke quadrangle: Darton, 03  
 Cass Co.: Woodruff, 06  
 eastern: Marcou, 67, 67a  
 Loup Valley: Hicks, 93  
 Republican River Valley: Condra, 07  
 Scotts Bluff quadrangle: Darton, 03a  
 Sioux City region: Burchard, 04  
 southeastern: Darton, 98; Prosser, 99b



## Geologic maps—Continued.

Nebraska: Western: Darton, 99a, 03b  
 Neocene: Dall, 92  
 Nevada: Guillemin-Tarayre, 71; Spurr, 03;  
     (part): Wheeler (G M), 76a  
     Antelope district: Schrader, 13  
     Aurora district: Hill (J M), 15  
     Battle Mountains: Hill (J M), 15  
     Big Smoky Valley: Meinzer, 17  
     Bullfrog district: Ransome, 10c  
     Carson area: Reid (J A), 11  
     Clark Co., Yellow Pine district: Knopf, 15  
     De Lamar district, Lincoln Co.: Miller  
     (G W), 08a  
     Douglas Co.: Hill (J M), 15  
     Elko Co.: Hill (J M), 16  
     Ely quadrangle: Spencer (A C), 17  
     Esmeralda formation: Turner, 00  
     Eureka district: Curtis, 84; Hague, 92;  
     Powell, 82  
     Goldfield and Bullfrog districts: Ransome, 07  
     Goldfield district: Hastings, 06a; Ransome, 09  
     Jarbidge, Contact, and Elk Mountain mining  
     districts: Schrader, 12  
     Manhattan district: Ferguson (H G), 17  
     Mineral Co.: Hill (J M), 15  
     National district: Lindgren, 15  
     northeastern: Emmons (W H), 10  
     Osceola district: Weeks, 08  
     Peavine district: Hill (J M), 15  
     Pioche and vicinity: Pack, 06  
     Pioche district, Lincoln Co.: Bell (R N), 11  
     Reese River basin: Waring (G A), 18  
     Rochester district: Schrader, 14c  
     Silver Peak quadrangle: Spurr, 06b  
     southwestern: Ball (S H), 07, 08a  
     Tonopah district: Burgess, 09; Rice (C T),  
     11a; Spurr, 03b, 05, 05e  
     Toyabe Range: Emmons (S F), 70; Hill  
     (J M), 15  
     Virginia district: Becker, 82  
     Walker River region: Smith (D T), 04  
     Washoe district: Becker, 82a; King (C), 70  
     White Pine district: Hague (A), 70; Larsh,  
     09  
     Yellow Pine district: Hill (J M), 14a  
     Yerington district: Knopf, 18a  
 Newark system: Hobbs, 01; Russell, 92  
 New Brunswick: Bailey (L W), 98b, 06;  
     Dawson (J W), 55; Ells, 85, 08a; Gilpin,  
     81; Johnson (J F W), 50; Matthew (G F),  
     97a  
     Albert and Westmoreland cos.: Bailey (L W),  
     78; Ells, 11a  
     Andover sheet, surface geology: Chalmers  
     02  
     Burnthill Brook area: Young (G A), 18  
     Carboniferous: Keele, 14  
     coal fields: Dowling, 13b  
     Dalhousie: Clarke (J M), 09a  
     Grand Manan Island: Bailey (L W), 71  
     Kennebecasis Valley: Matthew (G F), 98a  
     Little River group: Matthew (G F), 10a  
     Nipisiquit iron-ore deposit: Young, 11a  
     northern: Bailey (L W), 87; and eastern:  
     Ells, 83

## Geologic maps—Continued.

New Brunswick: St. John: Matthew (G F),  
     63; Matthew (W D), 94a  
     southeastern: Ells, 85a  
     southern: Bailey (L W), 65; Matthew (G F),  
     65c  
     surface geology: Chalmers, 87  
     Tobique and Nepisiquit rivers: Bailey (L  
     W), 64a  
     western: Bailey (L W), 86; Robb, 70  
 New England: Hitchcock (C H), 77; marble  
     belt: Brainerd, 85  
 Newfoundland: Howley, 07a, 09, 10a; Jukes, 43  
     Avalon Peninsula: Howley, 82; Murray, 82  
     Belvie Bay: Murray, 66  
     Port au Port and St George bays: Howley,  
     75  
     southeastern: Dale (N C), 15  
 New Hampshire: Hitchcock (C H), 70, 77g,  
     78e, 85; Jackson, 44, 45  
     Ammonoosuc gold field: Hitchcock (C H),  
     69, 78e, f, 04a  
     Belknap Mountains: Pirsson, 05b  
     Littleton: Hitchcock (C H), 05  
     Nashua: Tilton, 96a  
     southeastern: Katz, 17a  
     southwestern: Hitchcock (C H), 74d  
     surface geology: Hitchcock (C H), 78e  
     Tripyramid Mountain: Pirsson, 11  
     White Mountains: Hitchcock (C H), 72  
 New Jersey: Cook (G H), 65, 78a, 79, 81, 82,  
     89a; Credner, 70; Lewis (J V), 12a, 15;  
     N J G S, 18; Putnam, 86; Rogers (H D),  
     40a; Salisbury, 99; Whitfield, 85  
     Cape May Co.: Cook (G H), 57a  
     Cretaceous and Eocene: Clark (W B), 97c  
     eskers, Bergen Co.: Salisbury, 93  
     Franklin Furnace quadrangle: Spencer  
     (A C), 08d  
     Franklin Furnace region: Nason, 91  
     Green Pond region: Darton, 94f  
     Hunterdon Co. (part): Lyman, 93  
     Lake Passaic: Cook (G H), 80  
     Middlesex Co., clay: Cook (G H), 78a  
     mineral industries: Twitchell, 13  
     Monmouth and Middlesex cos.: Clarke (W B),  
     92, 93a  
     Morris Co.: Britton (N L), 87  
     Newark area: Lewis (J V), 07c, 08b  
     Newark rocks: Kümmel, 99b  
     New York City district: Merrill (F J H), 02  
     northern: Cook (G H), 74a; northern: Dar-  
     ton, 90  
     northwestern: Kümmel, 01b  
     Passaic quadrangle: Darton, 08b  
     Philadelphia district: Bascom, 09a  
     Pochuck Mountain: Britton (N L), 87  
     Raritan quadrangle: Bayley, 14  
     Sand Hills region: Clark (W B), 97e  
     surface geology: Cook (G H), 78  
     Sussex Co.: Shepard, 32a; Wolff (J E), 98  
     Warren Co., Jenny Jump Mountain: West  
     gate, 96  
 New Madrid earthquake: Fuller, 12  
 New Mexico: Marcou, 58; (part): Lindgren, 10;  
     (parts): Wheeler (G M), 76a



## Geologic maps—Continued.

New Mexico: Albuquerque district: Bryan, 09  
 Albuquerque region: Herrick, 00b  
 Bernalillo Co.: Herrick, 00a  
 Burro Mountains, Grant Co.: Paige, 11b;  
 Somers, 15  
 Carthage coal field: Gardner (J H), 10a  
 Cerrillos Hills: Johnson (D W), 03  
 Deming quadrangle: Darton, 17  
 Fluorite Ridge near Deming: Darton, 11a  
 Gallina-Raton Spring coal field: Gardner  
 (J H), 0  
 Grant Co.: Schwennesen, 18  
 Hanover iron district: Paige, 09  
 Jemez-Albuquerque region: Reagan, 03  
 Jornada del Muerto: Keyes, 05  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 mining map: Jones (F A), 15  
 Navajo country: Gregory (H E), 16a  
 northern: Gardner (J H), 09a; Stevenson, 81  
 northwestern: Darton, 10a; Dutton, 85  
 Puerco region: Gardner (J H), 10e  
 Pinos Altos district: Paige, 11a  
 Rio Grande Valley: Lee (W T), 07b  
 Roswell area: Fisher (C A), 06b  
 San Juan Co.: Bauer, 16  
 San Pedro district: Yung, 03  
 San Pedro region: Herrick, 98c  
 Santa Rita region: Paige, 12d  
 southern: Darton, 17a  
 Tijeras field, Bernalillo Co.: Lee (W T), 12  
 Valencia Co.: Herrick, 00a; Johnson (D W), 02  
 New York: Eaton (A), 28, 32; Eckel, 13; Hitch-  
 cock (C H), 70d; Leighton, 09; McGee,  
 94b; Miller (W J), 14; N Y G S, 42; Put-  
 nam, 86; Weeks, 05  
 Adirondack region: Newland, 08  
 Adirondacks, eastern: Kemp, 99; glacial  
 waters: Alling, 16  
 Adirondacks, north of: Cushing, 99  
 Albany Co.: Darton, 97a  
 Alexandria Bay quadrangle: Cushing, 10a  
 Attica-Depew quadrangles: Luther, 14  
 Auburn-Genoa quadrangles: Luther, 10  
 Becraft Mountain, Columbia Co.: Davis  
 (W M), 83c; Grabau, 03  
 Blue Mountain quadrangle: Miller (W J), 17  
 Brewster district: Koeberlin, 09  
 Broadalbin quadrangle: Miller (W J), 11b  
 Buffalo quadrangle: Luther, 06  
 Canandaigua and Naples quadrangles: Clarke  
 (J M), 04b  
 Canton quadrangle: Chadwick, 15; Martin  
 (J C), 16  
 Cape Vincent quadrangle: Cushing, 10a  
 Cayuga Co.: Hartnagel, 03  
 Cayuga Lake region: Cleland, 03a  
 central and eastern: Prosser, 97  
 central eastern, Devonian: Prosser, 99  
 Chenango Co.: Clarke (J M), 97  
 Clayton quadrangle: Cushing, 10a  
 Clinton Co.: Cushing, 94, 97, 01, 05a; Emmons  
 (E), 42  
 Clinton formation: Newland, 08a  
 Cortland Co.: Clarke (J M), 97  
 Cortlandt series: Rogers (G S), 11a

## Geologic maps—Continued.

New York: Dutchess Co.: Merrill (F J H), 05a  
 eastern: Dale, 99; Dewey, 24  
 economic products: Merrill (F J H), 04a  
 Elizabethtown quadrangle: Kemp, 10c  
 Elizabethtown region: Kemp, 99b  
 Elmira quadrangle: Clarke (J M), 05b  
 Erie Co.: Bishop, 97  
 Essex Co.: Hall (C E), 85a; Kemp, 94, 95, 97;  
 Essex and Willsboro townships: White  
 (T G), 94; Minerva: Finlay (G I), 02a  
 Frankfort region: White (T G), 99  
 Fulton Co.: Kemp, 01  
 Geneva-Ovid quadrangles: Luther, 09  
 glacial: Fairchild, 07  
 glacial lake succession: Fairchild, 09  
 Green Co.: Davis (W M), 83a  
 Grindstone quadrangle: Cushing, 10a  
 Hamilton Co.: Kemp, 99a  
 Hudson River beds: Ruedemann, 01  
 Hudson River (lower) region: Hovey, 12f  
 Hudson Valley: Dale, 04a  
 Jefferson Co.: Emmons (E), 42  
 Lake Champlain region: Marcou, 81  
 Lake Placid region: Kemp, 98  
 Letchworth Park: Clarke (J M), 08c  
 Little Falls quadrangle: Cushing, 05  
 Long Island: Fairchild, 17a; Fuller, 14;  
 Veatch (A C), 06c; Pleistocene: Wood-  
 worth, 01  
 Long Lake quadrangle: Cushing, 07a  
 Madison Co.: Lincklaen, 45  
 Manhattan Island: Cozzens, 43; Dana (J D),  
 80d  
 Mohawk Valley: Beecher, 86a; Cushing, 05a;  
 Darton, 97; Hall, 86; Roorbach, 13  
 Mooers quadrangle, Pleistocene: Woodworth,  
 05, 05a  
 New York City: Berkey, 09, 11; Gratacap, 01;  
 Martin (D S), 88  
 New York district: Merrill (F J H), 02  
 Niagara quadrangle: Kindle, 13c  
 Niagara River: Grabau, 01  
 North Creek quadrangle: Miller (W J), 13b,  
 14a  
 Odgensburg region: Cushing, 16  
 Olean quadrangle: Glenn, 03  
 Onondaga area: Hall, 94a  
 Onondaga Co.: Luther, 97a  
 Ontario Co.: Clarke (J M), 85b; Luther, 97  
 Orange Co.: Ries, 97b; Shepard, 32a; Trilo-  
 bite Mountain: Shimer, 05  
 Penn-Yann-Hammondsport quadrangles:  
 Luther, 06a  
 Placid quadrangle, central part: Miller (W J),  
 18a  
 Portage formation: Luther, 03  
 Portage group: Clarke (J M), 97  
 Portage-Nunda quadrangles: Clarke (J M),  
 08c  
 Port Henry quadrangle: Kemp, 10c  
 Port Leyden quadrangle: Miller (W J), 10  
 Poughkeepsie quadrangle: Gordon (C E), 11  
 Poughkeepsie region: Dwight, 86  
 Remsen quadrangle: Miller (W J), 09  
 Rensselaer grit plateau: Dale, 93  
 Richmond Co.: Britton (N L), 81a



## Geologic maps—Continued.

New York: Rochester and Ontario Beach quadrangles: Hartnagel, 07b  
 Rondout: Davis (W M), 83d; Van Ingen, 03  
 St. Lawrence and Jefferson cos.: McDonald (P B), 13  
 St. Lawrence River region: Smyth (C H), 01  
 Saranac Lakes region: Cushing, 02  
 Saratoga Co.: Kemp, 01  
 Saratoga district, Pleistocene: Fairchild, 17  
 Saratoga quadrangle, glacial: Stoller, 16  
 Saratoga Springs quadrangle: Cushing, 14  
 Schenectady quadrangle: Stoller, 11  
 Schoharie Valley: Grabau, 06  
 Schuylerville quadrangle: Cushing, 14  
 Seneca Co.: Lincoln, 97  
 Skunnemunk Mountain: Darton, 94f  
 southeastern: Mather, 43  
 Syracuse quadrangle: Hopkins (T C), 14  
 terminal moraine: Lewis (H C), 84  
 Theresa quadrangle: Cushing, 10a  
 Tully quadrangle: Clarke (J M), 05c  
 Ulster Co.: Darton, 94b; Saugerties: Chadwick, 10  
 Warren Co.: Kemp, 01  
 Watkins quadrangle: Clarke (J M), 05b  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 Westchester Co.: Dana (J D), 80d; Merrill (F J H), 05; Scharf, 86  
 western: Ashburner, 88; Johnson (L), 82; Pleistocene: Fairchild, 97c  
 Yates Co.: Wright (B H), 84  
 Nicaragua: Calderon y Arana, 82; Pis-Pis district: Hershey, 12a  
 North America: Bowman, 11; Margerie, 08; Pirsson, 15; Willis, 06a, 07, 12  
 Archean and Algonkian: Van Hise, 96  
 eastern, volcanic rocks: Williams (G H), 94  
 ice age: Chamberlin (T C), 13  
 Northern America: Isbister, 55  
 North Carolina: Kerr, 73, 75, 82, 88; Mitchell (E), 42; Nitze, 95, 96; Willis, 86a  
 Asheville quadrangle: Keith, 04  
 Coastal Plain: Clark (W B), 12  
 Cranberry quadrangle: Keith, 03  
 Dan River coal field: Stone (R W), 12a, 14a  
 Davidson Co.: Cid mining district: Pogue, 09b, 10  
 Deep River coal field: Emmons (E), 56  
 Deep River district: Wilkes, 59  
 Ellijay quadrangle: LaForge, 13  
 gold region: Mitchell, 29  
 iron ores: Nitze, 93a  
 Mount Mitchell quadrangle: Keith, 05a  
 Nantahala quadrangle: Keith, 07  
 Pisgah quadrangle: Keith, 07a  
 Roan Mountain quadrangle: Keith, 07b  
 Virgilina copper district: Laney, 08a, 17  
 western: Lewis (J V), 96; Pratt, 05  
 North Dakota: Leonard, 06d, 13, 17  
 Bismarck quadrangle: Leonard, 12  
 Cannonball River lignite field: Lloyd, 14  
 Casselton quadrangle: Hall (C M), 05  
 Fargo quadrangle: Hall (C M), 05  
 Fort Berthold Indian Reservation lignite field: Smith (C D), 09a  
 glacial: Todd, 96

## Geologic maps—Continued.

North Dakota: Nesson anticline, Williams Co.: Collier, 18b  
 Sentinel Butte lignite field: Leonard, 09  
 south central: Leonard, 12b  
 Standing River Indian Reservation: Calvert, 14  
 surface (Lake Agassiz): Leverett, 13e  
 Washburn lignite field: Smith (C D), 09  
 western: Lloyd, 15  
 North Platte River: Adams (G I), 02  
 Northwest Territory: Keele, 10  
 Coppermine River: Sandberg, 13  
 Hudson Bay region: Tyrrell, 97  
 Tazin and Taltson rivers: Camsell, 16  
 Winisk and Attawapiskat rivers region: McInnes, 09a  
 Nova Scotia: Brown (R), 45; Dawson (J W), 45, 50, 55; Faribault, 06a; Gesner, 36, 43a; Gilpin, 77a, 81; Hedley, 65; Malcolm, 12; Rickard, 12  
 Annapolis Co., Nictaux and Torbrook iron district: Fletcher, 05  
 Antigonish Co.: Honeyman, 66  
 Arisaig area: Twenhofel, 13  
 Arisaig-Antigonish district: Williams (M Y), 14  
 Boisdale Hills, Cape Breton Island: Boright, 04  
 Cape Breton Island: Fletcher, 78; Gilpin, 86c; Cape Dauphin district: Robb, 76; Sydney coal field: Fletcher, 77, 94, 00a; Robb, 76  
 coal fields: Dowling, 13b  
 eastern: Faribault, 87; Fletcher, 87  
 gold belt: Faribault, 99a, 00a; Gilpin, 86b  
 Hall Harbour sheet: Can G S, 10  
 Kings and Hants cos.: Fletcher, 02  
 Kingsport sheet: Can G S, 11  
 New Red Sandstone: Dawson (J W), 48b  
 northern: Ells, 85a  
 Oldham gold district: Faribault, 13  
 Pictou and Antigonish cos.: Ami, 01g  
 Pictou coal field: Logan, 70; Poole, 93, 04  
 southwestern: Bailey (L W), 95  
 Springhill coal field, Cumberland Co.: Fletcher, 03  
 Waverley district: Hind, 69  
 Windsor-Horton area: Bell (R N), 13  
 Ohio: Eckel, 13; Leverett, 97; Newberry, 68c, 70a, 71, 71c, 79; Ohio G S, 09; Orton, 86, 86b, 88i, 93a; Sayler, 65; Whittlesey, 49a, 56  
 Adams Co.: Locke, 38  
 Ashtabula, Lake, Geauga, and Trumbull cos.: Read, 73  
 Berea grit: Orton, 88c  
 Butler Co.: Orton, 78  
 Champaign Co.: Hill (F C), 78  
 Clarke Co.: Orton, 73  
 coal areas: Bownocker, 08  
 coal fields: Orton, 93d  
 Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Crawford Co.: Winchell (N H), 74  
 Cuyahoga Co.: Newberry, 73a  
 Defiance Co.: Winchell (N H), 74  
 Delaware Co.: Winchell (N H), 74



## Geologic maps—Continued.

- Ohio: Eastern: Orton, 80; Whittlesey, 69  
 Erie Co.: Newberry, 74b  
 Flushing quadrangle: Griswold, 08  
 Franklin Co.: Orton, 78a  
 Greene Co.: Orton, 74  
 Hamilton Co.: Orton, 73  
 Hancock Co.: Winchell (N H), 74  
 Hardin Co.: Winchell (N H), 74  
 Henry Co.: Winchell (N H), 74  
 Highland Co.: Orton, 71a  
 Highland, Ross, and Pike cos.: Orton, 74  
 Huntingdon quadrangle: Campbell (M R), 00a  
 Huron Co.: Read, 78  
 Kenova quadrangle: Phalen, 12  
 Licking Co.: Carney, 06  
 Logan Co.: Hill (F C), 78  
 Lucas Co.: Gilbert, 73  
 Marion Co.: Winchell (N H), 73  
 Maumee Valley: Gilbert, 73  
 Medina Co.: Wheat, 78  
 Meigs Creek coal field: Brown (C N), 84  
 Montgomery Co.: Orton, 71  
 Morrow Co.: Winchell (N H), 74  
 oil and gas fields, Allen, Auglaize, and Mercer cos.: Orton, 88j; Hancock and Wood cos.: Orton, 88k  
 Ottawa Co.: Winchell (N H), 74  
 Paulding Co.: Winchell (N H), 74  
 peat deposits: Dachnowski, 12  
 Pleistocene: Leverett, 97  
 Portage Co.: Newberry, 78a  
 Preble Co.: Orton, 78  
 preglacial drainage: Carney, 11b  
 Putnam Co.: Winchell (N H), 74  
 Richland, Ashland, Wayne, Knox, Holmes, Coshocton, and Licking cos.: Read, 78a  
 Sandusky Co.: Winchell (N H), 73  
 Seneca Co.: Winchell (N H), 73  
 southeastern: Andrews, 71a  
 southwestern: Fuller, 12b; Orton, 73; Pleistocene: Fuller, 12b  
 Steubenville quadrangle: Griswold, 07a  
 Summit Co.: Newberry, 73a  
 Union Co.: Winchell (N H), 74  
 Van Wert Co.: Winchell (N H), 74  
 Vermilion quadrangle, shore lines: Carney, 11  
 Warren Co.: Orton, 78  
 Waverly: Hyde, 15a  
 Wood Co.: Winchell (N H), 74  
 Wyandot Co.: Winchell (N H), 73  
 Ohio and Indiana: Leverett, 05; (parts): Orton, 91  
 Ohio Valley: Lawrence, 43a; Owen (D D), 46  
 Oil and gas fields, 1908: Day (D T), 09b  
 Oklahoma: Aurin, 17; Beal, 17; Eckel, 13; Fath, 17; Gould, 05, 11, 11b; Munn, 14; Shannon (C W), 17; Snider, 11, 13, 17; Wegemann, 15a; White (D), 18  
 Arbuckle Mountains: Buttram, 13; Reeds, 10; Taff, 04; Wallis, 15  
 Atoka quadrangle: Taff, 02  
 Colgate quadrangle: Taff, 01  
 Cotton and Jefferson cos.: Wegemann, 15a  
 Cushing oil field: Okla G S, 14a

## Geologic maps—Continued.

- Oklahoma: Eastern: Okla G S, 14; Shannon, 17;  
 Pennsylvanian formations: Gould, 10d  
 Fort Smith-Poteau field: Smith (C D), 14  
 gas and oil fields: Adams (G I), 01a  
 gas and oil region: Hutchison, 11  
 Grandfield district: Munn, 14  
 McAlester-Lehigh coal field: Taff, 99  
 Madill oil pool: Taff, 09c  
 mineral resources: Gould, 10c  
 Muscogee quadrangle: Taff, 06  
 northeastern: Siebenthal, 08a; Snider, 15;  
 Mississippian-Pennsylvanian contact: Snider, 12  
 northern part: Drake, 97  
 Osage Reservation: Bowen (C F), 18c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18  
 Ozark region: Adams (G I), 01  
 southern: Hutchison, 11; Stephenson, 18  
 Tahlequah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Wichita Mountains: Gould, 05; Taff, 04; Taylor (C H), 15  
 Ontario: Chapman (E J), 60; Ells, 95b; Hopkins (P E), 18b; Knight (C W), 15a; Logan 54b; Merritt, 88a; Miller (W G), 14, 15, 15a; (part): McInnes, 09a  
 Algoma, Bruce mines: Ingall, 05  
 Algoma, Michipicoten district: Coleman, 99  
 Algoma and Thunder Bay districts: Wilson (W J), 09  
 Animikie district: Van Hise, 11  
 Animikie region: Silver, 06  
 Bancroft sheet: Adams (F D), 08a  
 Beatty-Munro area: Hopkins (P E), 15a  
 Big Duck Lake area: Hopkins (P E), 15  
 Black Sturgeon Lake region: Coleman, 09a  
 Boston Creek area: Burrows, 16b  
 Bucke to Lake Nipigon: Collins (W H), 13b  
 Calabogie district: Lindeman, 14a  
 central: Barlow, 15  
 Cobalt area: Miller (W G), 13a  
 Collingwood: Parks, 13d  
 Credit River area: Parks, 13d  
 Dryden gold area, district of Kenora: Thomson, 18  
 Eagle Lake area: Parsons (A L), 11  
 eastern: Adams (F D), 08c; Ells, 04d  
 eastern gold belt: Miller (W G), 02  
 Espanola district: Quirke, 17  
 Essex and Kent cos.: Nattress, 07  
 feldspar deposits: DeSchmid, 16  
 Gauthier township: Burrows (A G), 17b  
 glacial shore lines: Ledoux (A), 18  
 Goodfish Lake area: Burrows (A G), 16b  
 Gowganda and Miller lakes area: Burrows (A G), 09  
 Gowganda district: Collins (W H), 09  
 Gowganda mining division: Collins (W H), 13  
 Gowganda to Porcupine area: McMillan, 12  
 Grenville sheet: Adams (F D), 13a; Ells, 01a  
 Gunflint area: Parsons (A L), 16  
 Hagersville district: Stauffer, 13  
 Haliburton-Bancroft area: Adams (F D), 13b  
 Hamilton area: Parks, 13c  
 Hunter Island: Parsons (A L), 16; Smith (W H C), 92a



## Geologic maps—Continued.

Ontario: Kingston area: Baker (M B), 16  
 Kirkland Lake and Swastika gold areas:  
 Burrows (A G), 14  
 Kowkash area: Hopkins (P E), 17  
 Lake Huron region: Coleman, 14  
 Lake Iroquois: Coleman, 04b  
 Lake Nipigon to Lake Abitibi: Burrows, 13a  
 Lake Nipigon-Clay Lake region: Collins  
 (W H), 09a  
 Lake of the Woods region: Bell (R), 83a;  
 Bigsby, 52; Coleman, 97; Lawson, 85;  
 Parsons (A L), 13  
 Lake Savant iron range area: Moore (E S), 10  
 Lake Superior, Woods Location: Macfarlane,  
 69  
 Lake Timiskaming region: Hume, 17; Miller  
 (W G), 05b  
 Lake Wendigokan region: Moore (E S), 09c  
 Lanark Co.: Vennor, 76  
 Larder Lake district: Brock, 07; Wilson  
 (M E), 12  
 lead and zinc deposits: Uglow, 16  
 Long Lake district: Baker (M B), 17  
 Long Lake region: Burrows (A G), 17  
 Loon Lake district: Parsons (A L), 13a  
 Madoc area: Knight, 13a  
 Magpie-Goudreau area: Parsons (A L), 15  
 Malachi to Richan: Collins (W H), 13b  
 Manitoulin Island: Foerste, 13; Williams  
 (M Y), 13a  
 Massey mine area: Coleman, 13b  
 Matachewan area: Burrows (A G), 18  
 Michipicoten area: Parsons (A L), 15  
 Michipicoten iron ranges: Bell (J M), 05;  
 Coleman, 02a, c  
 Michipicoten Island: Burwash, 05  
 Michipicoten mining division: Willmott, 98  
 Moose Mountain district: Lindeman, 14  
 Moose River region: Bell (R), 83  
 Nipigon Basin: Wilson (A W G), 10  
 Nipissing-Timiskaming area: Barlow, 99  
 northern nickel range: Coleman, 04a  
 northwestern, Mine Center region: Parsons  
 (A L), 18a  
 Onaping area: Collins, 17  
 Ottawa area: Johnston (W A), 17  
 Ottawa district: Ells, 01  
 Parry Island: Walker (T L), 13  
 Pembroke sheet: Ells, 07b  
 Point Mamainse: Lane, 12  
 Porcupine area: Burrows (A G), 15  
 Porcupine area and Temiskaming district:  
 Burrows (A G), 12  
 Porcupine district: Burrows (A G), 11  
 Port Colborne region: Stauffer, 13a  
 Port Coldwell district: Kerr, 10  
 Queensboro pyrite area: Knight, 13a  
 Rainy Lake region: Bigsby, 54; Lawson, 88  
 Rainy River district: Coleman, 95; Parks, 98;  
 Bears Passage: Uglow, 13; Golden Star  
 mine: Uglow, 13  
 Red Lake region: Dowling, 96  
 Richan to Bucke: Collins (W H), 13b  
 Seine River and Lake Shebandowan areas:  
 McInnes, 99  
 Silver Mountain area, district of Thunder  
 Bay: Bowen (N L), 11

## Geologic maps—Continued.

Ontario: Slate Islands: Parsons (A L), 18  
 southeastern: Uglow, 16; Vennor, 70  
 southwestern: Stauffer, 15; beaches: Chal-  
 mers, 03; moraines: Taylor (F B), 13c  
 Steeprock Lake district: Uglow, 13  
 Sturgeon Lake gold field, Thunder Bay dis-  
 trict: Moore (E S), 11a  
 Sudbury area: Collins (W H), 14a  
 Sudbury district: Bell (R), 91; Blue, 00;  
 Coleman, 13; Thomas (K), 14; Walker  
 (T L), 97; Asquith and Churchill town-  
 ships: Collins, 17; West Shiningtree area:  
 Collins (W H), 12  
 Sudbury nickel region: Coleman, 05  
 Sudbury-Cobalt-Porcupine region: Miller,  
 (W G), 13  
 Thunder Bay district: Blue, 97  
 Timagami district: Barlow, 04a  
 Toronto region: Coleman, 13e, j; Taylor (F B),  
 13b  
 Vermilion Lake pyrite deposits, Rainy River  
 district: Moore (E S), 11b  
 Whiskey Lake area: Coleman, 13a  
 Winisk River region: McInnes, 04  
 Oregon: Condon, 02; McCornack, 06  
 Columbia River gorge region: Williams (I A),  
 16a  
 Coos Bay coal field: Diller, 99; Smith (G O),  
 02  
 Coos Bay quadrangle: Diller, 01  
 Cracker Creek mining district: Pardee, 09  
 Crater Lake National Park: Diller, 02  
 Curry Co.: Butler (G M), 16  
 Douglas Co.: Diller, 08  
 eastern: Lindgren, 01  
 Harney Basin region: Waring, 09  
 John Day region: Collier, 14  
 Klamath Mountains: Diller, 14a  
 Portland: Darton, 09b  
 Port Orford quadrangle: Diller, 03  
 road materials: Parks (H M), 12  
 Roseburg quadrangle: Diller, 98  
 Sumpter quadrangle: Pardee, 14  
 Vale district: Washburne, 11  
 Ozark region: Adams (G I), 01  
 Ozark uplift: Siebenthal, 15  
 Panama Canal Zone: MacDonald (D F), 15  
 Peat, distribution: Davis (C A), 11  
 Penokee series: Irving, 92  
 Pennsylvania: Eckel, 13; Ihlseng, 00; Lesley,  
 73, 86e, 92; Putnam, 86; Rogers (H D),  
 58, 58g; Stone (R W), 08b; (part): Willis,  
 93b  
 Accident and Grantsville quadrangles:  
 Martin (G C), 08a  
 Adams Co.: Pa G S, 2d, 76a  
 Allegheny Co.: Jillson, 66; Stevenson, 77;  
 White (I C), 78  
 Amity quadrangle: Clapp (F G), 07a; eco-  
 nomic: Clapp (F G), 07c  
 anthracite coal fields: Ashburner, 85; Fisher,  
 36; Pa G S, 2d, 90; Rogers (H D), 58h  
 anthracite region: Bowen (E), 48; Daddow,  
 66; Rogers (H D), 58; Stoek, 02  
 atlas: Ashburner, 83a  
 Mahanoy and Shenandoah basins: Ash-  
 burne, 81b  
 Panther Creek Basin: Ashburner, 83



## Geologic maps—Continued.

Pennsylvania: Atlas: Lesley, 85  
 Barnesboro and Patton quadrangles: Campbell (M R), 13a  
 Beaver Co.: White (I C), 78  
 Beaver quadrangle: Woolsey, 05, 06a  
 Bedford Co.: Stevenson, 85  
 Berks Co.: D'Invilliers, 83; Pa G S, 2d, 91; Spencer (A C), 08a; Oley Valley: Bertelet, 56  
 bituminous coal field: Halberstadt, 07; White (D), 02  
 Blair Co.: Platt (F), 81a  
 Boyertown region: Bliss, 13; Jonas, 17  
 Bradford Co.: Horton, 59; Sherwood, 78  
 Broadtop coal field: Gardner (J H), 13a, 14  
 Brownsville quadrangle: Campbell (M R), 03  
 Bucks and Montgomery cos.: Lyman, 95  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Burgettstown and Claysville quadrangles: Griswold, 07a  
 Butler Co.: Chance, 79; White (I C), 78  
 Cambria: Platt (F), 77  
 Cameron Co.: Sheaffer, 85  
 Carbon Co.: Ashburner, 84a; Pa G S, 2d, 91  
 Pennsylvania, Carnegie quadrangle, oil and gas fields: Munn, 11a  
 Center Co.: D'Invilliers, 84; (part): Ziegler, 12  
 Chester Co.: Frazer, 83; Hartman, 57; Doe Run-Avondale region: Bliss (E F), 16  
 Clarion Co.: Chance, 80b  
 Clarion quadrangle: Munn, 10a  
 Claysville quadrangle: Munn, 12  
 Clearfield Co.: Chance, 84  
 Clinton Co.: Chance, 80  
 Coatesville quadrangle: Bliss (E F), 14  
 Connellsville quadrangle: Campbell (M R), 03  
 Cornwall iron district: D'Invilliers, 86a  
 Crawford Co.: White (I C), 81  
 Cumberland Co.: Pa G S, 2d, 76a  
 Dauphin Co.: Pa G S, 2d, 91  
 Delaware Co.: Hall (C E), 85; Smith (G), 62  
 Dillsburg iron fields: Harder, 10g  
 eastern: Lesley, 65; Pre-Cambrian and Triassic diabase: Jonas, 17  
 Easton: Finch (J), 24  
 Ebensburg quadrangle: Butts, 05b  
 Elders Ridge quadrangle: Stone (R W), 05a, b  
 Elk Co.: Ashburner, 85a  
 Elkland quadrangle: Fuller, 03a  
 Erie Co.: White (I C), 81  
 Fayette Co.: Stevenson, 77, 78a  
 Forest Co.: Ashburner, 85a  
 Foxburg and Clarion quadrangles: Shaw (E W), 11e  
 Franklin Co.: Pa G S, 2d, 76a  
 Fulton Co.: Stevenson, 85  
 Gaines quadrangle: Fuller, 03  
 Gettysburg region: Stose, 16  
 Greene Co.: Stevenson, 78a  
 Huntingdon Co.: Ashburner, 78; White (I C), 85; Greenwood Furnace area: D'Invilliers, 91  
 Huntingdon, Mifflin, Centre, and Union cos.: D'Invilliers, 91

## Geologic maps—Continued.

Pennsylvania: Indiana Co.: Anderson (W), 60, Platt (W G), 78  
 Indiana quadrangle: Richardson (G B), 04a  
 Jacksonwald district: Wherry, 10  
 Jefferson Co.: Platt (W G), 81  
 Johnstown quadrangle: Phalen, 10, 11a  
 Kittanning quadrangle: Butts, 04, 06a  
 Lancaster Co.: Frazer, 80  
 Latrobe quadrangle: Campbell (M R), 04  
 Lawrence Co.: White (I C), 79  
 Lebanon Co.: Lesley, 92; Spencer (A C), 08a  
 Lehigh and Northampton cos.: Peck, 11  
 Lehigh Co.: Lesley, 83a; Prime, 78  
 Lycoming Co.: Sherwood, 80  
 McKean Co.: Ashburner, 80  
 Masontown quadrangle: Campbell (M R), 02a  
 Mercer Co.: White (I C), 80  
 Mercersburg-Chambersburg district: Stose, 09  
 Mifflin and Juniata cos.: D'Invilliers, 91  
 Monterey district: Bascom, 96  
 Montgomery Co.: Carter, 84  
 Northampton Co.: Lesley, 83a  
 northern: Ashburner, 88  
 oil regions: Carll, 87  
 Panther Creek Valley: Richards (W B), 13  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Perry Co.: Claypole, 85; Dewees, 85  
 Philadelphia Co.: Jewell, 56  
 Philadelphia district: Bascom, 09a  
 Philadelphia region: Hall (C E), 81; Heilprin, 85; Troost, 26; Troost's map: Merrill (G P), 00c  
 Pike and Monroe cos.: White (I C), 82  
 Pocono Mountain region, glacial: Lesley, 82  
 Potter Co.: Sherwood, 80a  
 Rogersville quadrangle: Clapp (F G), 07b  
 Rural Valley quadrangle: Butts, 05a, 06a  
 Schuylkill Co.: Pa G S, 2d, 91; Sheaffer, 54  
 Sewickley quadrangle: Munn, 10, 11  
 Somerset Co.: Platt (F), 77a  
 southeastern: Bastin, 10; Frazer, 82; Hall (C E), 80a; Walcott, 96a; Wherry, 08a  
 South Mountain: Eaton (H N), 12; Stose, 06, 10  
 southwestern: Carll, 87; Clapp (F G), 05; Pa G S, 14a; oil and gas: Pa G S, 16  
 Sullivan Co.: Sherwood, 80  
 Susquehanna and Wayne cos.: White (I C), 81a  
 Susquehanna River, buried channel: Darton, 14  
 Susquehanna River region: White (I C), 83  
 terminal moraine: Lewis (H C), 84  
 Tioga Co.: Sherwood, 78  
 Tioga quadrangle: Fuller, 03a  
 Triassic area: Wherry, 13  
 Union and Snyder cos.: D'Invilliers, 91  
 Uniontown quadrangle: Campbell (M R), 02a  
 Venango Co., oil region: Eaton (S J M), 66  
 Warren Co.: Carll, 83  
 Warren quadrangle: Butts, 10  
 Washington Co.: Stevenson, 78a  
 Waynesburg quadrangle: Stone (R W), 05



## Geologic maps—Continued.

Pennsylvania: Western, oil regions: Lucas, 75  
western and adjoining areas, oil and gas:  
Carll, 90  
Westmoreland Co.: Stevenson, 77, 78a  
Wyoming Co.: Sherwood, 82  
York Co.: Frazer, 86a  
Permo-Carboniferous: Case, 15  
Pre-Cambrian: Van Hise, 92  
Lake Superior region: Van Hise, 09a  
North America: Van Hise, 09a; Walcott, 10  
Preglacial valleys, Indiana and Illinois: Clem,  
11  
Prince Edward Island: Dawson (J W), 55, 71;  
Ells, 85, 03b  
Quebec: Logan, 52b  
Abitibi district: Wilson (W J), 10  
Anticosti: Schmitt, 04  
Argenteuil and Ottawa cos.: Logan, 59  
asbestos district: Dresser, 10d; Harvie, 13  
Bancroft sheet: Adams (F D), 10d  
Bell River region: Wilson (M E), 14  
Broadback River region: Cooke (H C), 14  
Chaleur Bay: Clarke (J M), 13d  
Coleraine area: Knox, 18  
copper-bearing rocks: Bancroft (J A), 15  
Côte St. Pierre: Stansfield, 13  
Dalhousie: Clarke (J M), 13d  
Dominion mine: Stansfield, 13  
eastern townships: Ells, 87a  
Emerald mine: Stansfield, 13  
Fabre township: Harvie, 11  
feldspar deposits: DeSchmid, 16  
Gaspé: Clarke (J M), 08b; Hunt, 65a  
Gaspé Co., Lemieux: Mailhiot, 18; Ste. Anne  
River: Mailhiot, 11; York River: Mail-  
hiot, 11  
Gaspé Peninsula: Clarke (J M), 13d; Richard-  
son (J), 58, 59  
Grenville district: Wilson (M E), 17a  
Grenville region: Logan, 57, 63  
Grenville sheet: Adams (F D), 13a; Ells, 01a  
Harricanaw basin: Tanton, 15  
Harricanaw region: Bancroft (J A), 13a  
iron ore deposits: Cirkel, 09  
Kewagama Lake area: Wilson (M E), 13c  
Lake Megantic: Dresser, 08a  
Lake St. John district: Dresser, 16  
Lake Timiskaming area: Wilson (M E), 10a  
Lévis: Raymond (P E), 13b  
Megantic Co.: Poitevin, 18  
Mistassini region: Low, 85a  
Monteregian Hills: Adams (F D), 13a  
Montmorency Falls: Raymond (P E), 13b  
Montreal: Adams (F D), 13a; area north of:  
Adams (F D), 96a  
Montreal area: Ells, 96  
Montreal Island: Adams (F D), 04  
Morin area: Adams (F D), 93  
Mount Johnson: Adams (F D), 13a  
Mount Yamaska: Young (G A), 06  
Nellis mine, Cantley: Stansfield, 13  
Nipissing-Timiskaming area: Barlow, 99  
Nottaway River region: Bell (R), 02  
Ottawa area: Johnston (W A), 17  
Ottawa Co.: Vennor, 78  
Ottawa district: Ells, 01

## Geologic maps—Continued.

Quebec: Ottawa region: Gordon (C H), 95b  
Patricia district: Anon, 12d  
Pembroke sheet: Ells, 07b  
Percé: Clarke (J M), 05a  
Pontiac Co.: Wilson (M E), 12  
Portneuf Co. (part): Bancroft (J A), 16  
Quebec: Bigsby, 53; Marcou, 91; and vicinity:  
Raymond (P E), 13b  
St. Bruno Mountain: Dresser, 10a  
St. Helen's Island: Nolan, 03  
St. Hilaire and Rougemont mountains:  
O'Neill, 14  
St. Lawrence, region south of: Richardson  
(J), 70  
Scaumenac Bay: Clarke (J M), 13d  
southern: Dresser, 12; copper-bearing rocks:  
Dresser, 04; serpentine belt: Dresser, 10c  
surface geology: Chalmers, 87  
Temiscouata and Rimouski cos.: Bailey (L  
W), 93  
Thetford-Black Lake district (Coleraine  
sheet): Knox, 17  
Three Rivers sheet: Ells, 00  
Ungava region: Low, 99a  
Walker mine: Stansfield, 13  
Red River region: Hill (R T), 94  
Rhode Island: Emerson (B K), 07, 17; Haw-  
kins, 18; Hitchcock (C H), 60e; Jackson,  
40; Loughlin, 14b  
Barrington area: Shaler, 96  
coal field: Ashley, 15  
Conanicut Island: Crosby, 97a  
Diamond Hill-Cumberland district: Warren  
(C H), 14  
Kingston area: Loughlin, 10a  
Narragansett Bay: Dale, 85  
Narragansett Basin: Ashley, 14; Shaler, 99  
northern: Brown (C W), 10  
Portsmouth coal basin: Brown (C W), 10  
Rio Grande-Pima, N. Mex.-Ariz.: Antisell, 56  
Rocky Mountain coal fields: Storrs, 02  
Rocky Mountain region: Hayden, 83a  
St. Martin (West Indies): Molengraaff, 88  
Salvador: Dollfus, 68  
San Domingo, Santiago: Heneken, 53  
Santo Domingo: Gabb, 73  
Saskatchewan: Bryce, 07; Hind, 59; McInnes,  
13a; Malcolm, 13; Ries, 12c  
Amisk Lake district: Bruce, 18  
coal areas: Dowling, 09, 13b  
Cypress Hills-Wood Mountain region: Mc-  
Connell, 85  
southern: Davis (N B), 18  
Wood Mountain-Willowbunch area: Rose, 16  
Snake River region: U S G S Terr, 72  
South Carolina: Hammond (H), 83; Lieber,  
59d; Sloan, 07, 08; Tuomey, 48  
Abbeville district: Lieber, 60  
Anderson district: Lieber, 60  
Chester district: Lieber, 56  
Chesterfield district: Lieber, 56  
Greenville district: Lieber, 59  
Lancaster district: Lieber, 56  
Pickens district: Lieber, 59  
Pisgah quadrangle: Keith, 07a  
Spartanburg district: Lieber, 58



## Geologic maps—Continued.

South Carolina: Union district: Lieber, 58  
 York district: Lieber, 56  
 South Dakota: Darton, 09a; Todd, 95  
 Aberdeen-Redfield district: Todd, 09  
 Alexandria quadrangle: Todd, 03c  
 Belle Fourche quadrangle: Darton, 09e  
 Black Hills: Carpenter (F R), 88; Darton, 01a, 09; Ferguson (H G), 08; Frazer, 98a; Jaggar, 01; Newton, 80; O'Harra, 00a, 10; Scott (S), 97; Ward (L F), 99; Winchell (N H), 75; artesian conditions: Darton, 18; northern: Irving, 99; Jaggar, 04c  
 Cheyenne River Indian Reservation: Calvert, 14  
 De Smet quadrangle: Todd, 04a  
 eastern: Todd, 04b  
 Edgemont quadrangle: Darton, 04a  
 glacial: Todd, 96  
 Great Sioux Reservation: Willis, 85  
 Harding Co.: Winchester, 16  
 Huron quadrangle: Todd, 04  
 Lead City: Irving, 02  
 Lincoln Co.: Bendrat, 04  
 Mellette, Washabaugh, Bennett, and Todd cos.: Perisho, 12  
 Mitchell quadrangle: Todd, 03b  
 Oelrichs quadrangle: Darton, 02a  
 Olivet quadrangle: Todd, 03  
 Parker quadrangle: Todd, 03a  
 Perkins Co.: Winchester, 16  
 Rosebud Indian Reservation: Reagan, 05  
 southeastern: Todd, 00  
 Standing Rock Indian Reservation: Calvert, 14  
 western: Lloyd, 15  
 Southwestern coal field: Taff, 02a  
 Taconic area: Walcott, 88  
 Taconic Range: Dana (J D), 82b  
 Taconic region: Dale, 05a  
 Tennessee: Currey, 54, 56; Eckel, 13; Jenkins, 15; Killebrew, 74, 74a, 76; Safford, 56, 56a, 69, 74, 88, 96a; Saylor, 66; Tenn Agr Exp Sta, 96; Troost, 40  
 Briceville quadrangle: Keith, 96b  
 Bristol quadrangle: Campbell (M R), 99a  
 Chattanooga quadrangle: Hayes, 94b  
 Chilhowee Mountain: Keith, 92  
 Cleveland quadrangle: Hayes, 95a  
 Cleveland region: Stose, 18  
 coal formation: Troost, 35  
 Cocke Co.: Troost, 40  
 Columbia quadrangle: Hayes, 03  
 Cranberry quadrangle: Keith, 03  
 Davidson, Williamson, and Maury cos.: Troost, 43  
 eastern: Willis, 86a  
 Ellijay quadrangle: LaForge, 13  
 Greenville quadrangle: Keith, 05; Willis, 93b  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Loudon quadrangle: Keith, 96  
 McMinnville quadrangle: Hayes, 95c  
 Maynardville quadrangle: Keith, 01  
 mineral map: Killebrew, 76c  
 Morristown quadrangle: Keith, 96a  
 Nantahala quadrangle: Keith, 07

## Geologic maps—Continued.

Tennessee: Nashville: Jones (P M), 92  
 Ocoee district: Troost, 37  
 Perry Co.: Wade (B), 14  
 Pikeville quadrangle: Hayes, 95b; Phalen, 11  
 Roan Mountain quadrangle: Keith, 07b  
 Sevier Co.: Troost, 41  
 Sewanee quadrangle: Hayes, 94c  
 Standingstone quadrangle: Campbell (M R), 99  
 Sweetwater region: Stose, 18  
 Tuckahoe district: Gordon (C H), 12a  
 Wartburg quadrangle: Keith, 97  
 Waynesboro quadrangle: Miser, 17a  
 western: Dunbar, 18; Nelson (W A), 11; Wade, 17  
 Texan region: Hill (R T), 93  
 Texas: Dumble, 90; Eckel, 13; Paige, 11; Roemer, 49; Udden, 16a  
 Archer Co.: Roessler, 76  
 Austin quadrangle: Hill (R T), 02  
 Austin region: Hill (R T), 98b  
 Black and Grand prairies: Hill (R T), 01  
 Brazos Co.: Kennedy, 93  
 brown coal and lignite area: Dumble, 92b  
 central mineral region, economic: Comstock, 91  
 Colorado coal field: Drake, 93, 17  
 Corsicana field: Matson, 17b  
 Dallas Co.: Shuler, 18  
 eastern: Dumble, 15; Johnson (L C), 88  
 Electra and Petrolia oil and gas fields: Udden, 12d  
 El Paso quadrangle: Richardson (G B), 09  
 Franklin Mountains: Richardson (G B), 06a  
 Grimes Co.: Kennedy, 93  
 Gulf Coastal Plain: Hayes, 03a  
 Houston Co.: Kennedy, 92a  
 Lasalle and McMullen cos.: Deussen, 16  
 Llano and Burnet quadrangles: Paige, 12  
 Llano quadrangle: Paige, 11  
 Llano-Burnet region: Paige, 11  
 Llano Estacado: Cummins, 92a  
 Nueces quadrangle: Hill (R T), 98a  
 north central: Hager, 18a  
 north of Colorado River: Taff, 93  
 northeastern: Gordon (C H), 11; Stephenson, 18  
 northern: Gordon (C H), 11a; Munn, 14; Wegemann, 15a; northwestern: Cummins, 91; Loew, 73.  
 Palestine salt dome: Hopkins (O B), 17  
 Panhandle: Gould, 07  
 Presidio Co., Shafter district: Udden, 04  
 Robertson Co.: Kennedy, 93  
 Runnels Co.: Beede, 18  
 Terrell Co.: Christner, 18  
 trans-Pecos Texas: Richardson (G B), 04  
 Uvalde quadrangle: Vaughan, 00  
 Val Verde Co.: Roberts (J R), 18  
 Van Horn quadrangle: Richardson (G B), 14  
 various counties: Roessler, 76  
 western: Hill (B F), 04a  
 Wichita region: Gordon (C H), 13  
 Tobago: Craig, 07  
 Triassic, eastern United States: Lyman, 94a;  
 New Jersey and Pennsylvania: Hawkins, 14



## Geologic maps—Continued.

Trinidad: Wall, 60; Naparima district: Harrison (J B), 99  
 Uinta Basin: Eldridge, 01  
 United States: Barbee, 68; Bell (I L), 92; Chamberlin, 04; Cleaveland, 16; Hitchcock (C H), 73g, h, 74, 76d, 87; Hitchcock (E), 53, 61e; Höfer, 78; McGee, 85a, 94a; Maclure, 17, 18; Marcou, 53, 55c, h, 58; Rogers, 56a  
 clay deposits: Ries, 03  
 coal and iron: Bell (I L), 92  
 coal fields: Campbell (M R), 08a, 13, 17a; Hayes, 02a; Hitchcock (C H), 74a; Macfarlane, 73  
 east of Mississippi: Maclure, 09, 11  
 east of Rocky Mountains: Bowie, 17; Bradley, 76  
 eastern: Ruedemann, 10  
   Catoctin belt: Keith, 94a  
   greensand deposits: Ashley, 17a  
 eastern and middle States: Hall, 43b  
 eastern and southern: Heilprin, 84, 84a  
 eastern half: Moxon, 43  
 Eocene: Smith (J H), 00  
 fossil plants, distribution: Ward (L F), 89  
 glacial striae: Chamberlin (T C), 88  
 gypsum deposits: Burchard, 11b  
 limestone areas: Burchard, 14  
 limestone formations: Burchard, 11a  
 middle and western States: Hall, 43  
 oil and gas fields, 1913: Day (D T), 14b  
 physiographic divisions: Fenneman, 17  
 salt, sulphur, and pyrite deposits: Phalen, 11b  
 slate deposits: Dale, 14  
 southern Oligocene: Maury, 02  
 southwestern: Guillemin-Tarayre, 71  
 west of Mississippi River: Hall, 57a, b  
 western: Campbell (M R), 16; Darton, 15; Diller, 15; Lee (W T), 15  
 Utah (part): U S G S Terr., 83c; (parts): Wheeler (G M), 76a  
   Bingham district: Keith, 05b; economic geology: Boutwell, 05e  
   Book Cliffs coal field: Richardson (G B), 09b  
   Castle Valley: Lupton, 16a  
   Clifton (Deep Creek) district: Kemp, 18b  
   coal: Watts, (A C), 16  
   Coalville field: Wegemann, 15  
   Cottonwood districts: Howard, 16  
   Cottonwood-American Fork region: Butler (B S), 15  
   Crawford Mountains: Gale, 10b  
   Green River desert: Emery, 18a  
   Green River field: Lupton, 14  
   high plateaus: Dutton, 80  
   Iron Springs district: Leith, 08a  
   Jensen quadrangle: Gale, 10  
   Lake Bonneville: Gilbert, 82  
   Laketown area: Gale, 10b  
   Mercur Basin: Spurr, 95  
   Morgan Co., Lost Creek field: Clark (F H), 18a  
   northeastern: Gale, 09; U S G S Terr., 83b; White (C A), 89  
   Ogden and vicinity: Blackwelder, 10a  
   Oquirrh Mountains: Spurr, 95  
   Park City district: Boutwell, 07, 12  
   phosphate deposits: Waggaman, 10

28738°—24—14

## Geologic maps—Continued.

Utah: San Francisco district: Butler (B S), 13, 14a  
   San Juan oil field: Woodruff, 12  
   Salt Lake quadrangle: Atwood, 09  
   southern, coal fields: Richardson, (G B), 09a  
   Tintic district: Smith (G O), 00; Tower, 99  
   Toquerville district: Huntington, 04  
   Uinta Basin: Eldridge, 96  
   Uinta Mountains: Powell, 76; Schultz, 18a; glacial: Atwood, 09  
   Uinta Range: Weeks, 07  
   Utah Co., Deep Creek district: Lupton, 12  
   Wasatch Co., Blacktail Mountain coal field: Lupton, 12a  
   Wasatch Mountains: Dana (J D), 90f; Emmons (S F), 93  
   White River region: Eldridge, 96  
   Woodruff area: Gale, 10b  
 Vermont: Hager, 59; Hitchcock (C H), 77g, 85; Hitchcock (E), 61  
   Addison Co.: Seely, 10  
   Albany: Richardson (C H), 12a  
   asbestos area: Marsters, 05  
   Ascutney Mountain: Daly, 03  
   Bennington: Gordon (C E), 14  
   Bird Mount: Dale, 00  
   Burlington quadrangle: Perkins (G H), 10b  
   Calais: Richardson (C H), 16  
   Charlotte: Perkins, 08b  
   Craftsbury: Richardson (C H), 12  
   East Shoreham: Perkins (G H), 16  
   economic products: Perkins (G H), 10d  
   Fort Cassin area: Whitfield, 86  
   Grand Isle: Perkins (G H), 02d, 16  
   Grand Isle Co.: Perkins (G H), 04 b  
   Greensboro: Richardson (C H), 14  
   Hardwick: Richardson (C H), 14a  
   Irasburg: Richardson (C H), 12b  
   Isle La Motte: Perkins (G H), 16  
   Lake Champlain region: Marcou, 81  
   marble belt: Brainerd, 85  
   mineral resources: Perkins (G H), 04a  
   Montpelier: Richardson (C H), 16  
   Orange Co.: Richardson (C H), 02  
   Orleans Co.: Richardson (C H), 08  
   Ripton region: Dale 10a  
   Rutland-Danby ridge: Dale, 94a  
   St. Albans: Edson, 06a  
   surface geology: Hitchcock (E), 61  
   Swanton: Edson, 08  
   Taconic Range: Dale, 04c  
   western: Dale, 99, 14  
   Woodbury: Richardson (C H), 14a  
 Virgin Islands: Cleve, 71  
 Virginia: Benton, 86a; Eckel, 13; Hotchkiss, 76, 80e; Rogers (W B), 75b, 84; Watson (T L), 11, 11d  
   Abingdon quadrangle: Stose, 14  
   Arvonian slate belt: Taber (S), 13b  
   Arvonian-New Canton area: Taber (S), 13  
   Big Stone Gap coal field: Campbell (M R), 93  
   Bristol quadrangle: Campbell (M R), 99a  
   Buchanan Co.: Hinds, 18  
   Bucu quadrangle: Hinds, 16  
   Clintwood quadrangle: Hinds, 16  
   Coastal Plain: Clark (W B), 12b



## Geologic maps—Continued.

Virginia: Eastern: Darton, 91b  
 Estillville quadrangle: Campbell (M R), 94  
 Fauquier-Culpeper cos.: Watson (T L), 13d  
 Floyd-Carroll-Grayson region: Currey, 59  
 Franklin quadrangle: Darton, 96c  
 Fredericksburg quadrangle: Darton, 94d  
 Giles, Bland, and Wythe cos.: Stevenson, 87  
 Harpers Ferry quadrangle: Keith, 94  
 Holston Valley, Saltville area: Stose, 13  
 Lee, Wise, Scott, and Washington cos.: Stevenson, 81d  
 Massanutten Mountain: Spencer (A C), 97  
 middle eastern: Watson (T L), 12e  
 middle western: Watson (T L), 13c  
 mines and quarries: Va G S, 09  
 Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Monterey quadrangle: Darton, 99  
 New River-Cripple mineral region: McCreath, 87  
 Nomini quadrangle: Darton, 96a  
 Norfolk quadrangle: Darton, 02  
 northeastern: Watson (T L), 11f  
 Pocahontas quadrangle: Campbell (M R) 96a  
 Potomac basin, west of Blue Ridge: Hotchkiss, 82a  
 Potomac formation: Fontaine, 96  
 Pound quadrangle: Butts, 14, 14a  
 Richmond area: Darton, 11; Shaler, 99a; Woodworth, 02  
 Russell and Tazewell cos.: Stevenson, 85a  
 Russell Fork district: Stone (R W), 08  
 southwestern: Boyd (C R), 81, 83; Eckel, 04a; Lesley, 73; Stevenson, 81d  
 Staunton quadrangle: Darton, 94e  
 Tazewell quadrangle; Campbell (M R), 97  
 Virgilina district: Laney, 17  
 Washington quadrangles: Darton, 01  
 Washington: Landes, 02a, 03,\* (part): Smith (G O), 02  
 Blewett district: Weaver, 11  
 Cascade Mountains: Russell, 00  
 Cascade Range: Smith (G O), 04b  
 central: Russell, 93a  
 coal areas: Tarr (R P), 07  
 Columbia plains: Calkins, 05  
 Colville Indian Reservation: Pardee, 18a  
 Conconully and Ruby districts: Jones (E L), 16  
 Covada district: Weaver, 13  
 Ellensburg quadrangle: Smith (G O), 03, 03a  
 Index district: Weaver, 12  
 King Co.: Evans (G W), 12  
 Kittitas Co.: Saunders, 14  
 Monte Cristo district: Spurr, 01  
 Mount Rainier, glaciers: Russell, 98a  
 Mount Stuart quadrangle: Smith (G O), 03a, 04  
 Myers Creek mining district: Umpleby, 11  
 Olympic Peninsula: Arnold, 06a; Reagan, 09; Weaver, 16  
 Oroville-Nighthawk mining district: Umpleby, 11a  
 Pierce Co.: Daniels, 14  
 Puget Sound region, glaciation: Bretz, 11  
 Republic district: Lindgren, 14a; Umpleby, 10

## Geologic maps—Continued.

Washington: Skykomish basin: Smith (W S), 15  
 Snoqualmie quadrangle: Smith (G O), 06b  
 south central: Waring (G A), 13  
 southwestern: Weaver, 16  
 Tacoma quadrangle: Willis, 99  
 western: Weaver, 12a, 16  
 Wilkeson coal field: Willis, 86d  
 Yakima Co. (part): Smith (G O), 01  
 Washington, D. C., quadrangles: Darton, 01; McGee, 91c  
 West Indies, northeastern: Cleve, 71  
 West Virginia: Eckel, 13; Hotchkiss, 80e; Rogers (W B), 75b; White (I C), 04a  
 Accident quadrangle: Martin (G C), 08  
 Barbour Co.: Reger, 18  
 Boone Co.: Krebs, 15  
 Braxton and Clay cos.: Hennen, 17  
 Ohio and Hancock cos.: Grimsley, 07  
 Buckhannon quadrangle: Taff, 96  
 Cabell, Wayne, and Lincoln cos.: Krebs, 13  
 Charleston quadrangle: Campbell (M R), 01:  
 coal, oil, natural gas, and limestone areas:  
 W Va G S, 08  
 Doddridge and Harrison cos.: Hennen, 12  
 economic: W Va G S, 17  
 Franklin quadrangle: Darton, 96c  
 Harpers Ferry quadrangle: Keith, 94  
 Huntington quadrangle: Campbell (M R), 00a  
 Jackson, Mason, and Putnam area: Krebs, 11  
 Jefferson, Berkeley, and Morgan cos.: Grimsley, 16  
 Kanawha Co.: Krebs, 14  
 Kenova quadrangle: Phalen, 12  
 Lewis and Gilmer cos.: Reger, 16  
 Logan Co.: Hennen, 14a  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Mercer Co.: Krebs, 16  
 Mingo Co.: Hennen, 14a  
 Monterey quadrangle: Darton, 99  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Piedmont quadrangle: Darton, 96b  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Preston Co.: Hennen, 14  
 Raleigh Co.: Krebs, 16  
 Raleigh quadrangle: Campbell (M R), 02  
 Steubenville quadrangle: Griswold, 07a  
 Summers Co.: Krebs, 16  
 Tazewell quadrangle: Campbell (M R), 97  
 Upshur Co.: Reger, 18  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Wyoming and McDowell cos.: Hennen, 15  
 Western interior coal field: Bain, 02a  
 Western States: Wheeler (G M), 76a  
 Western United States: Vivian, 79  
 Windward Islands: Spencer (J W), 02  
 Wisconsin: Chamberlin (T C), 77b, 83; Hotchkiss, 12; Irving, 80b; Kirchoffer, 05; Lapham, 55a, 69, 76; Leith, 15b; Mead (D W), 94a; Weidman, 15  
 Baraboo district: Van Hise, 11; Weidman, 04  
 Bluffs: Weidman, 95  
 central: Irving, 77



## Geologic maps—Continued.

Wisconsin: Chippewa land district: Owen (D D), 48  
 clays: Buckley, 01  
 Devil's Lake region: Trowbridge, 17  
 Douglas Co.: Grant (U S), 00  
 eastern: Alden, 04; Chamberlin (T C), 77a; Cleland, 11  
 Florence district: Van Hise, 11  
 Grant, Iowa, and Lafayette cos.: Grant (U S), 03  
 Lake Superior district; Irving, 80a; Sweet, 80  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
 Milwaukee quadrangle: Alden, 06  
 north central: Weidman, 07a  
 northern: Irving, 74, 74a, 80  
 northwestern: Hotchkiss, 15; Weidman, 11b; Quaternary: Strong, 80  
 Penoque region: Irving, 90  
 Penoque series: Irving, 92  
 Penoque-Gogebic iron region: Irving, 85b; Van Hise, 86, 93a, 01, 11  
 Quaternary: Chamberlin (T C), 77b  
 St. Croix Dailes: Berkey, 97  
 southeastern: Alden, 18; Pleistocene: Alden, 05; surficial: Alden, 18  
 southern: Mead (D W), 93; pre-Cambrian outcrops: Weidman, 98  
 southwestern: Strong, 77  
 west end of Lake Superior: Thwaites, 12  
 western: Grout, 10a  
 Wisconsin Valley: Irving, 82a  
 Zinc and lead region: Bain, 06; Grant (U S), 06  
 Wisconsin, Iowa, and Minnesota: Owen (D D), 52  
 World: Hitchcock (E), 53; Marcou, 73, 75; Margerie, 14  
 Wyoming: Hayden, 83a; Knight (W C), 00; Trumbull, 17; (part): Hayden, 72a; U S G S Terr, 83c  
 Absaroka quadrangle: Hague, 99b  
 Aladdin quadrangle: Darton, 05b  
 Atlantic City district: Trumbull, 14  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Basin oil field: Lupton, 16  
 Beckwith Hills area: Gale, 10b  
 Big Horn Basin: Fisher (C A), 06; Hewett, 17; Woodruff, 10  
 Big Horn Basin coal field: Washburne, 09; Woodruff, 09a  
 Big Horn Mountains: Darton, 06b, e; Lupton, 16b  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Big Muddy and Douglas oil and gas fields: Wyo St G, 15  
 Big Muddy dome: Barnett, 14b  
 Black Hills region: Darton, 09  
 Buffalo coal field: Gale, 10d  
 central: Hares, 16; U S G S Terr, 83  
 central and south-central: Darton, 08  
 Cokeville area: Gale, 10b  
 Devils Tower quadrangle: Darton, 07b  
 Douglas oil field, Converse Co.: Barnett, 14; Jamison, 12

## Geologic maps—Continued.

Wyoming: Embar formation: Condit, 16  
 Encampment district: Spencer (A C), 04  
 Fremont Co., Atlantic district: Spencer (A C) 16  
 Copper Mountain district: Trumbull, 16a  
 Pilot Butte field: Ziegler, 16  
 Glenrock coal field: Shaw (E W), 09  
 Grass Creek field: Hintze, 15b  
 Great Divide Basin coal field: Smith (E E), 09  
 Hartville quadrangle: Smith (W S T), 03  
 Hay Creek region: Ward (L F), 99  
 Lander oil field: Woodruff, 11  
 Laramie area: Kemp, 05e  
 Laramie Basin: Darton, 09f  
 Laramie quadrangle: Darton, 10c  
 leucite hills, Sweetwater Co.: Kemp, 03  
 Lincoln Co.: Schultz, 14  
 Little Buffalo Basin field: Hintze, 15a  
 Little Snake River coal field: Ball (M W), 09, 10  
 Lodgepole Valley: Meinzer, 17a  
 Lost Spring coal field: Winchester, 12  
 Moorcroft field: Barnett, 14a  
 Muddy Creek oil field, Carbon Co.: Jamison, 12  
 Newcastle quadrangle: Darton, 04  
 North Laramie Mountains: Spencer (A C), 16a  
 northwestern: Eldridge, 94a  
 oil fields: Trumbull, 13  
 Old Woman Creek district: Darton, 01a  
 Owl Creek Mountains: Darton, 06  
 Park Co., Sunshine: Moody, 18  
 Patrick and Goshen Hole quadrangles: Adams (G I), 02  
 phosphate deposits: Waggaman, 10  
 Powder River coal field: Stone (R W), 10a  
 Powder River oil field: Wegemann, 12  
 Rock Springs coal field: Schultz, 09, 10  
 Rock Springs uplift and Dry Lake Dome: Trumbull, 15, 16  
 Salt Creek oil field, Natrona Co.: Jamison, 12a; Wegemann, 11, 18  
 Salt River Range: Mansfield, 16a  
 Sheridan coal field: Taff, 09  
 Sherman quadrangle: Darton, 10c  
 Sublette Mountains: Gale, 10b  
 Sundance quadrangle: Darton, 05a  
 Sussex coal field: Wegemann, 12a  
 Sweetwater district: Knight (W C), 01  
 Uinta Co.: Schultz, 08  
 western: Comstock, 74; Schultz, 18; U S G S Terr, 83a, b  
 Wind River region: Woodruff, 12c  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yellowstone National Park: Hague, 96; U S G S Terr, 83d  
 Electric Peak and Sepulchre Mountain: Iddings, 91  
 Gallatin Range: Iddings, 99  
 Junction Valley: Holmes (W H), 83  
 Yukon: Bel, 05; Keele, 10  
 Braeburn-Kynocks area: Cairnes, 10a  
 coal fields: Cairnes, 12g  
 Conrad and Whitehorse districts: Cairnes, 08a  
 international boundary: Cairnes, 14



## Geologic maps—Continued.

- Yukon: Klondike region: McConnell, 00, 00a, 07; Nordenskjöld, 99  
 Kluane district: McConnell, 05a  
 Lake Laberge district: Cairnes, 08b  
 Macmillan River: McConnell, 03  
 Salmon River gold field: McConnell, 02  
 Tantalus coal area: Cairnes, 10a  
 upper White River district: Cairnes, 15  
 Wheaton district: Cairnes, 12  
 Windy Arm district: McConnell, 05b

Geologic materials, classification of: Grout, 09

Geologic record, causes of imperfection: Shaler, 95f

Geologic thermometer: Johnston (J), 13b; Wright (F E), 10b, c, 11b

## Geologic time.

Calculation: Clarke (J M), 99h; Knight (W C), 99b

Date of glacial epoch, calculation of: Bagg, 11

Erosion in Indiana: Culbertson, 12

General: Bannister, 97; Barrell, 17; Buckhout, 96; Dawson (J W), 69b; Gilbert, 00; Le Conte, 78c; Miller (A M), 14a; Schuchert, 13d; Upham, 93b, c; 94i, 97e, 06a; Walcott, 93; Wright (G F), 12a, 13a

Geologic chronology for North America: Schuchert, 14e

Glacial epoch and man: Wright (G F), 08

Glacial era, date: Wright (G F), 81

Glacial time: Berkey, 05; Upham, 06

Glaciation in Alaska: Capps, 15e

Laminated clays, interpretation: Berkey, 05

Length: Fairchild, 94d

Measurement: Berkey, 07a; of postglacial time through sedimentation in lakes: Hotchkiss, 17

Meteor dust: Lane, 13

Niagara Falls and Gorge: Gilbert, 94a; Gregory (J W), 08a; Spencer (J W), 94h, 13c; Upham, 94i, 01, 08a; Wright (G F), 84e

Ontario shore line, age and origin: Spencer (J W), 17

Pleistocene: Fairchild, 13; Upham, 13a

Pleistocene climatic oscillations: Reeds, 15

Postglacial erosion and oxidation: Fairchild, 12b

Postglacial time: Andrews (E), 70; Culbertson, 98; Elftman, 03a; Manson, 03a; Matthew (G F), 03c; Wright (G F), 03c

Postglacial and interglacial: Coleman, 14b

Quaternary era, duration: Upham, 94c, g, 96m

Sedimentary measurement: Gilbert, 95c

Wave work as a measure of time: Coleman, 17

Geological biology: Williams (H S), 95

Geological chart: Winchell (A), 70c

Geological railway guide: Macfarlane, 79

Geological reports, illustrations: Ridgway, 13

Geological Society of America. *See* Associations.

Geological Surveys. *See* Surveys.

Geology and engineering practice: Winslow, 89

Geology and the public service: Smith (G O), 17b

Geology applied to mining: Spurr, 04

Geometry of faults: Reid (H F), 09a, 10b

Geomorphogeny. *See* Physiographic geology.

Geomorphology. *See* Physiographic geology.

## Geomorphy.

Continents, origin: Dana (J D), 85c; Pierce, 57  
 Continents and ocean basins, permanence: Le Conte, 86a

General: Dana (J D), 66; Green (W L), 75, 77; Grimes, 58; Owen (R), 84, 84a; Taylor (W B), 85

Ocean basins: Dana (J D), 85c

Plan of the earth: Gregory (J W), 99; Taylor (F B), 10

Recurrent tetrahedral deformations and intercontinental torsions: Emerson (B K), 17a

Terrestrial spheroid, derivation from rhombic dodecahedron: Owen (R), 88

Tetrahedral theory: Green (W L), 77

## Geophysics.

Calcite, solubility in sea-water: Wells, 18a

Contraction of molten rock: Barus, 91

Crystals, growing, linear force: Hostetter, 17

Daubrée experiment and capillarity: Johnston (J), 14

Deformation of rocks under pressure: Adams (F D), 98d

Earth as a heat engine: Becker, 15a

Earth's crust, strength: Barrell, 14a

Evaporation of water at depth by natural gases: Mills (R V A), 17

Experimentation on rocks: Adams (F D), 04b

Failure of cavities in crystals and rocks under pressure: Bridgman, 18

Feldspars, insomorphism and thermal properties: Day (A L), 05a; melting phenomena: Bowen (N L), 13b

Flow of marble, experimental investigation: Adams (F D), 01

Flow of rocks: Adams (F D), 05a

Fundamental problems of geology: Chamberlin (T C), 04b, 05

General: Van Hise, 04b; Woodward (R S), 03

Geophysical research: Day (A L), 11

Gravity anomalies: Barrell, 14a

High pressures, effects: Johnston (J), 13a

High temperature work: Barus, 93

Igneous fusion: Barus, 93

Iron oxides: Day (A L), 17

Lava maculae: Hobbs, 13

Magmatic gases: Meunier, 14

Melting points of cristobalite and tridymite: Ferguson (J B), 18

Mineral and rock densities at high temperatures, determination of: Day (A L), 14

Pressure in formation of rocks and minerals: Johnston (J), 15

Pressure within the earth: Slichter, 98

Problems: Becker, 04a

Rigidity of the earth: Becker, 90; Michelson, 14

Salt crystals, growth: Long, 17

Sulphides, dissociation pressures: Allen (E T), 17

Ternary system  $MgO-Al_2O_3-SiO_2$ : Rankin, 18

Georges Creek coal field, Md.: Hall (R D), 11a; Parsons (F W), 06a

Georgetown quadrangle, Colo.: Ball (S H), 08; Spurr, 08; pre-Cambrian: Ball (S H), 06

Georgetown quadrangle, Ky.: Miller (A M), 13a



## Georgia.

Atlanta region: Purington, 94  
 Soil geology: Loughridge, 84d; northwestern Ga.: McCutchen, 84  
 Stone Mountain: Hillyer, 75  
 Survey reports: Little, 75, 76; Spencer (J W), 91; Yeates, 93, 94

*Economic geology.*

Asbestos: Hopkins (O B), 14, 14a  
 Atlanta-Greenville: Campbell (J L), 83  
 Auriferous slate deposits: Mell, 81  
 Barite: Watson (T L), 15; Cartersville district: Hayes, 08b; Vivian, 16  
 Bauxite: Hayes, 94d, 95d; McCalley, 94; Judd (E K), 07a; McCallie, 11a; Ries, 96b; Veatch (J O), 08a; Watson, 01c, 04  
   central Ga.: Watkins, 15b  
   Coastal Plain: Shearer, 17  
   Coosa Valley: Hayes, 95g  
   Floyd Co.: Nichols, 88  
   Wilkinson Co.: Veatch (J O), 08a  
 Burke Co.: Cotting, 36  
 Cement materials: Eckel, 13; McCallie, 10; northern Ga.: Maynard, 12  
 Clay: Ladd, 98; Veatch (J O), 09  
   Dry Branch region: Veatch (J O), 08b  
   middle Ga.: Ladd, 99  
   northern: Maynard, 12  
 Clinton iron ore, Chattanooga region: Burchard, 09a  
 Coal: McCallie, 04, 10; Porter (J B), 87  
 Copper: McCallie, 10; Weed, 04a, 05, 06, 11  
   Cherokee Co.: Deby, 55  
   Seminole deposit: Watson, 04a  
 Corundum: King (F P), 94; Shepard, 72a; Smith (J L), 73a  
 Dahlonega district: Eckel, 03g, h  
 Diamonds, Hall Co.: Jackson, 59a  
 Ellijay quadrangle: LaForge, 13  
 Feldspar: Galpin, 15; Macon district: Maynard, 16  
 Fuller's earth: Vaughan, 03a  
   Coastal Plain: Shearer, 17  
   southwestern Ga.: Vaughan, 02a  
 Garnet deposits, Porter Springs district: Richard, 11a  
 General: Blake (W P), 60f; Brewer, 95b; Henderson (J T), 85; Little, 75, 76, 76a, 78; McCutchin, 85; Stephenson, 71; White (G), 49  
 Glass-sand deposits: Burchard, 07d  
 Gneiss: Watson, 02  
 Gold: Brewer, 96b, 97, 97b, f; Dickson, 34; Hanna, 82; Jones (S P), 09; McCallie, 97, 10; Peck, 32; Phillips (W), 33; Pratt, 02h; Schmidhuber, 43; Soper, 10a; Tatham, 98; Yeates, 96  
   Cherokee Co.: Blake (W P), 60c; Shepard, 58  
   Dahlonega district: Blake (W P), 58c, 59c, 60d; Credner, 67; Eckel, 03, 03g; Jackson, 54c, e, 59; Lindgren, 06c  
   McDuffie Co.: Fluker, 02  
   origin: Jackson, 59c  
   slate belt: Mell, 81  
   Villa Rica district: Brewer, 97c  
   White Co.: Collins (G E), 01  
 Granite: McCallie, 10; Watson, 02, 10, 10a

## Georgia—Continued.

*Economic geology—Continued.*

Graphite: McCallie, 10; near Cartersville: Hayes, 08c  
 Halloysite: Watkins, 13a  
 Iron: McCallie, 00b, 08a, 10; Porter (J B), 87; Watson (T L), 09a; Willis, 86a  
   brown ores: McCallie, 00a  
 Cartersville district: Hayes, 01d, 03f  
 Chattanooga district: Higgins (E), 09; Clinton ore: Burchard, 09a  
 Ellijay: Phalen, 08  
 fossil iron ore deposits: Ball (S M), 09b  
 northwestern Ga.: Burchard, 14a  
 Polk, Bartow, and Floyd cos.: McCallie, 00  
 Rome quadrangle: Hague, 02  
 Kaolin: Mell, 82  
   Dry Branch district: Sproat, 16; Veatch (J O), 08b  
   Macon district: Maynard, 16  
 Kaolins and fire clays: Veatch (J O), 07  
 Limestone: McCallie, 10; Coastal Plain: Brantley, 16  
 Limestones and cement materials: Maynard, 12  
 Macon-Birmingham belt: Spencer (J W), 89  
 Manganese: Brewer, 96d; Harder, 10; Watson (T L), 08, 09a; Willis, 86b; Anon, 18a  
   Cartersville district: Hayes, 03e  
   geologic relations: Watson, 04e  
 Marble: McCallie, 94, 07a, 10; Ellijay quadrangle: LaForge, 13  
 Marl, Coastal Plain: Brantley, 16  
 Mica: Galpin, 15; McCallie, 10  
 Mineral paint ore: Burchard, 07e  
 Mineral resources: McCallie, 01a, 10, 11; northern Ga.: Blake (W P), 96b; northwestern Ga.: Brewer, 96  
 Mineral springs: McCallie, 13  
 Northwestern Ga.: Burns, 87; Spencer (J W), 93  
 Novaculite, Lincoln Co.: Keeney, 29  
 Ocher deposits: McCallie, 10b, 12; Watson, 06; Cartersville district, Bartow Co.: Couper, 00; Hayes, 03k; Watson, 04f  
 Phosphate: McCallie, 96  
 Polk Co.: Spencer (J W), 91a  
 Potash-bearing slates: McCallie, 17; Cartersville: Shearer, 18a  
 Pyrite deposits: Shearer, 18; Dahlonega district: Eckel, 03  
 Richmond Co.: Cotting, 36  
 Ringgold quadrangle: Hayes, 94  
 Road materials: McCallie, 01, 10a  
 Rome quadrangle: Hayes, 02  
 Sand: McCallie, 10  
 Shale: McCallie, 10  
 Slate: Dale, 06c; McCallie, 10; Shearer, 18a  
   Polk Co.: Shepard, 58a  
   green: Maynard, 13a, 14a  
 Soapstone: Hopkins (O B), 14; McCallie, 10; Mell, 82  
 Southwestern Ga.: Spencer (J W), 91a  
 Talc: Hopkins (O B), 14; McCallie, 10  
 Tin: Blake (W P), 74  
*Historical geology*  
 Altamaha formation: Veatch (J O), 08  
 Apalachicola River: Dall, 94



## Georgia—Continued.

*Historical geology*—Continued.

- Appalachians, southern: Bradley, 75; Elliott (J B), 83  
 Appomattox formation: McGee, 90; Spencer (J W), 90f  
 Atlanta-Greenville: Campbell (J L), 83  
 Bauxite region: Watson, 04  
 Borings: McCallie, 98  
 Burke Co.: Cotting, 36  
 Burr millstone, Bainbridge: Couper, 46  
 Cartersville area: Hayes, 95i  
 Cartersville district, Bartow Co.: Watson, 04f  
 Catoosa Co.: Vogdes, 79  
 Chattahoochee River section: Langdon, 91  
 Chipola Miocene, Bainbridge: Foerste, 93a  
 Claiborne and Jackson deposits: Cooke (C W), 18  
 Coastal Plain: Brantley, 16; Couper, 46a; Hodgson, 46; Shearer, 17; Stephenson (L W), 15a; Veatch (J O), 11a  
 Columbia formation: Spencer (J W), 90f  
 Coosa Valley: Hayes, 94e  
 Crystalline belt: King (F P), 94  
 Dahlonega district: Eckel, 03g  
 Ellijay quadrangle: LaForge, 13  
 Eocene: Harris, 96b; Lyell, 45b, 46; central Ga.: Harris, 02  
 General: Henderson (J T), 85; Hopkins (O B), 14; Little, 76a, 78; McCallie, 08, 10; McCutchen, 85; Shepard, 33; Stephenson (M F), 71; White (G), 49  
 Granites: Watson, 01b, 02  
 Lafayette and Columbia formations: Harper, 02a  
 Lignitic stage: Harris, 97  
 Macon-Birmingham belt: Spencer (J W), 89  
 Miocene at Porters Landing: Vaughan, 10a  
 Northern Ga.: Maynard, 12; Shearer, 18  
 Northwestern Ga.: Burns, 87; Hayes, 91, 92, 97b; McCallie, 04; McCutchen, 84; Spencer (J W), 93  
 Oligocene: Maury, 02; Flint River: Dall, 16  
 Orthophragmina, stratigraphic value: Cooke (C W), 17  
 Polk Co.: Spencer (J W), 91a  
 Quitman: McCallie, 05  
 Richmond Co.: Cotting, 36  
 Ringgold quadrangle: Hayes, 94  
 Rome quadrangle: Hayes, 02  
 Shell Bluff, Burke Co.: Vaughan, 01c  
 Skiddaway Island: Couper, 46a  
 Slate deposits: Shearer, 18a  
 Southern Ga.: Couper, 43  
 Southwestern Ga.: Foerste, 94; Spencer (J W), 91a  
 Stevenson quadrangle: Hayes, 95  
 Tallulah gorge: Jones (S P), 01  
 Tertiary: Heilprin, 84a  
   coral reef, Bainbridge: Vaughan, 00e  
   correlation: Vaughan, 18d  
   southwestern Ga.: Pumpelly, 93  
 Trap dikes: McCallie, 01b
- Mineralogy.*  
 Bornite, Dahlonega: Jackson, 59a, m  
 Cherokee Co.: Alger, 49  
 Corundum: King (F P), 94  
 Cyanite, Lincoln Co.: Rath, 81  
 Enstatite: Koenig, 77b

## Georgia—Continued.

*Mineralogy*—Continued.

- General: Blake (W P), 60f  
 Graphite in vein quartz: Veatch (J O), 11  
 Graves Mountain: Watson (T L), 12f  
 Halloysite: Vander Meulen, 17  
 Lazulite, pyrophyllite, and tetradymite: Shepard, 59  
 Meteorite, Chattooga Co.: Kunz, 87d  
 Cherokee Mills, Cherokee Co.: Howell (E E), 95  
 Dalton, Whitfield Co.: Merrill (G P), 16c; Shepard, 83  
 Forsythe Co.: Beall, 30; Cohen, 97a  
 Losttown, Cherokee Co.: Shepard, 68a, 69  
 Paulding Co.: Watson, 13b  
 Pickens Co.: McCallie, 09a  
 Putnam Co.: Willet, 54  
 Stewart Co.: Smith (J L), 70b  
 Thomson: Merrill (G P), 09  
 Union Co.: Shepard, 54  
 Whitfield Co.: Hidden, 81a; Merrill (G P), 16c  
 Native gold with sillimanite: Watson (T L), 12b  
 Rutile, Graves Mountain: Rath, 80  
 State museum of minerals at Atlanta: Gratacap, 08  
 Sulphuret of copper, Canton mine: Pratt (N A), 57  
 Sundry minerals: Jackson, 59c  
 Tellurbismuth, Dahlonega: Balch, 63  
 Tetradymite: Genth, 60, 60a; Jackson, 60a  
 Uranophane, Stone Mountain: Watson, 02c
- Paleontology.*  
 Adocidae, Tertiary: Cope, 78e  
 Arcas: Sheldon, 17  
 Brunswick Canal fossils: Couper, 42  
 Burr mill stone, Bainbridge: Couper, 46  
 Calymene, Silurian: Vogdes, 80  
 Carapa, Eocene: Berry, 17e  
 Clinton: Foerste, 89a  
 Coastal Plain: Couper, 46a; McCallie, 08  
 Cretaceous: Gabb, 77; Upper, floras: Berry, 14  
 Echinoidea, Tertiary: Bouvé, 51; Stefanini, 12  
 Elephas: Falconer, 63  
 Eocene: Conrad, 50; Lyell, 45b; flora: Berry, 10k, 14  
 Hippopotamus: Moore (J), 90  
 Mammalia, Darien: Owen (R), 46  
   southern Georgia: Couper, 43  
 Megalonyx: Cooper (W), 27  
 Megatherium: Cooper (W), 24; Hodgson, 46; Mitchill, 23  
 Mesozoic flora: Berry, 10b  
 Oligocene, Flint River: Dall, 16  
 Orthophragmina: Cushman, 17  
 Pentremite: Schuchert, 06a  
 Pliocene Mollusca: Aldrich, 11a; Dall, 13  
 Pygorhynchus, Millstone grit: Bouvé, 46  
 Stricklandinia, Catoosa Co.: White (C A), 81d  
 Tertiary coral reef, Bainbridge: Vaughan, 00e  
 Triolobita: Salter, 59a; Clinton group: Vogdes, 86, 86a  
 Turbinella, Richmond Co., Ga.: Dall, 04c  
 Vertebrata: Habersham, 46; Harlan, 42a
- Petrology.*  
 Basic magnesian rocks: King (F P), 06  
 Dahlonega district, Lumpkin Co.: Watson, 96  
 General: Hopkins (O B), 14



## Georgia—Continued.

*Petrology*—Continued.

Gneiss: Watson, 02

Granite: Watson, 01, 01b, 02, 10a; phenocrysts in: Watson, 01a

Hornblende gabbro, La Grange: Brokaw, 16a

Itacolumite: Shepard, 45a

Pegmatite: Galpin, 15

Stone Mountain granite, aplite, pegmatite, and tourmaline bunches: Watson, 02a

*Physical geology*.

Cleavage structure resembling stretched pebbles: Phalen, 10a

Folding, Great Valley: Margerie, 92a

Marble belt of Fannin Co.: LaForge, 08

Ravine, Milledgeville: Linton, 98

Ringgold quadrangle: Hayes, 94

Sandstone dikes, Columbus: McCallie, 03a

Stretched pebbles: McCallie, 06, 07

Weathering of granitic rocks: Watson, 01

*Physiographic geology*.

Atlanta region: Purington, 94

Camp Gordon region: Matthes, 18a

Cartersville area: Hayes, 95i

Chattanooga district: Hayes, 99e

Coastal Plain: Stephenson, 15a; Veatch (J O), 11a

Ellijay quadrangle: LaForge, 13

General: Loughridge, 84d

Gulf Coastal Plain: Sutherland, 08

Northwestern Ga.: McCutchen, 84; Spencer (J W), 93

Rome quadrangle: Hayes, 02

Tallulah district, drainage modifications: Johnson (D W), 07, 07c

Tallulah gorge: Jones (S P), 01

*Underground water*.

Artesian wells: McCallie, 98

Coastal Plain: Stephenson (L W), 15a

General: Darton, 96d; McCallie, 04a, 05a

Intermittent flowing well, Albany: McCallie, 06a

Mineral springs: McCallie, 13

Mineral waters from crystalline rocks: Fuller, 06d

Quitman: McCallie, 05

Report: McCallie, 08

Warm Springs: Weed, 05f

Geosyncline, western interior: Van Tuyl, 17

Geothermal data: Darton, 13d

Geothermal gradient: Lane, 02f; Winchell (A N), 11d

Geothermic gradients and petroleum: Shaw, (E W), 12a

Germanium: Browning, 17b

Gesner, Abraham, biography: Gesner (G W), 96; Matthew (G F), 97a

## Geysers.

Action, cause: Andrews (E), 74, 76; Le Conte, 78b; Von Engeln, 16

Artificial: Waitz, 06d

California: Goodale, 67; Pluton: Shepherd, 51

Costa Rica: Pittier, 10

Eruption conditions: Jaggar, 98a

General: Davison (J M), 10; Peale, 77d, 83c, 84; Toula, 87a; Weed, 90, 93b, 12e

Mexico, Guanajuato, Comanjilla: Wittich (E), 10c

Ixtlan: Waitz, 06a

## Geysers—Continued.

Mexico: Michoacan: Caballero, 05a

Soaping geysers: Hague, 89a

Yellowstone National Park: Cadell, 92; Comstock, 74; Crook, 97; Dana (E S), 76; Forwood, 82; Hague, 11, 12; Hayden, 72, 72c; Leclercq, 85; Peale, 83; Anon, 73a

Geyser basin, extinct, southwestern Colorado: Comstock, 86a

Geyser waters and deposits, Yellowstone National Park: Leffmann, 83

Geyserite, literature: Merrill (G P), 88c; Nebraska: Hicks, 88

Gigantopteris: White (D) 12

Gila River alum deposits: Hayes, 07

Gilbert, G. K., biography: Davis (W M), 18c; Fairchild, 18c

Gilbert Gulf: Fairchild, 07c

Gillicus: Hay (O P), 98a

Gilsonite: Claypole, 89b; origin: Richardson (C), 16a; Utah: Bardwell, 18; Maguire, 00b; Weston, 04

Giroux, N. J., biography: Ells, 97b

Glacial canyons: McGee, 83f, 94c

Glacial cirques. *See* Cirques.

Glacial epoch.

Cause, etc.: Agassiz (L), 64a, b; Am G, 89; Becker (G F), 94; Bownocker, 95; Chamberlin (T C), 91c, 99a, 06b; Claypole, 88, 98a; Dana (J D), 83; Gilbert, 75; Hilgard, 07; Hill (E), 85; Hopkins (T C), 01b, 03; Huntington, 14a; Lindgren, 92a; McGee 81d; Manson, 91, 92, 94, 03, 17; Newberry, 76b; Norton (H B), 13; Perry (J B), 70a; Reagan, 14, 16b; Roberts, 16; Rogers (H D), 45b; Rutland, 01; Schaeberle, 06, 08b; Scharff, 09; Sewell, 06; Shaler, 68a; Tarr, 93b; Torrell, 78; True (H L), 02; Upham, 89f, 90c, 93a, j, 94j, 96c, 99a, b, 02, 08, 13a; Wallace (A R), 94; Warring, 76, 85; White (I C), 83d; Whitney, 80a; Wright (G F), 89, 96

atmospheric agency: Chamberlin (T C), 99a

eccentricity theory: Rice (W N), 86a

meteorological hypothesis: Reed (H S), 00

submarine volcanoes: Henry, 80

Chronology: Wright (G F), 08b

Date: Bagg, 11; True (N T), 69a; Shaler, 91a

Glacial epoch and man: Wright (G F), 08, 08b

Glacial epochs: David, 07

Glacial erosion.

Alaska, rock glaciers: Capps, 10a

Yakutat Bay region: Tarr (R S), 09

Wrangell Mountains: Capps, 10

California, Sierra Nevada: Muir, 74b; Yosemite Valley: Andrews (E C), 10; Matthes, 11

Canadian glaciers: Sherzer, 08

Channels on drumlins: Barton, 94

Colorado, Sawatch Range: Davis (W M), 04a

Connecticut, Pomperaug Valley: Hobbs, 02b

Examples: Tarr, 05c

Excavation of valleys and lake basins: Niles, 73

General: Blake (W P), 00; Brigham (W T), 63c;

Carney, 09a; Chamberlin (T C), 88, 11b,

Culver, 95; Davis (C A), 11c; Davis (W M);

82a, 12b; Fairchild, 05; Meunier, 15; New-

berry, 83h, 85, 85h; Niles, 78a; Shaler, 93a;

Spencer (J W), 88, 89b; Tarr, 93; Tyrrell,

11a; Williams (E H), 97



## Glacial erosion—Continued.

- Hanging valleys: Johnson (D W), 09a  
 High latitudes: Spencer (J W), 88  
 Ice caps and valley glaciers, relative erosive efficiency: Daly, 11c  
 Ice-sheet erosion: Salisbury, 11; and deposition in Great Lakes region: Taylor (F B), 11b  
 Illinois: Rich, 15c  
 Land forms produced by glacial erosion: Davis (W M), 10d  
 Maine: Stone (G H), 82  
 Maturity in Alpine glacial erosion: Johnson (W D), 04  
 Minneapolis, Minn.: Sardeson, 05  
 Montana, sublacustrine: Davis (W M), 17c  
 Mountain glacial erosion: Hobbs, 16a  
 New Hampshire, White Mountains: Emerson (P), 00  
 New York, Finger Lake region: Campbell (M R), 04d; Lincoln, 94; Von Engeln, 18a  
 Rochester: Dewey, 39, 43  
 southwestern Adirondacks: Miller (W J), 03a  
 Thousand Islands region: Cushing, 10a  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 Ohio, Kelleys Island: Carney, 10  
 Ontario, glacial markings: Andrews (E), 83  
 Rock basins: Von Engeln, 18a  
 Rocky Mountains: Matthes, 02  
 Sapping process: Johnson (W D), 99  
 Work in high mountains: Johnson (W D), 99a  
 Wyoming, Big Horn Mountains: Matthes, 00  
 Yukon: Tyrrell, 10b
- Glacial formations, classification: Chamberlin, 91d; Newberry, 70h
- Glacial geology. *See also* Drift deposits; Glacial epoch; Glacial lakes; Glacial striae; Glacial time; Quaternary.
- Agassiz and the ice age: Wright (G F), 98  
 Alaska: Capps, 15e; Gilbert, 04; Muir, 84; Tarr (R S), 12, 12c  
 Broad Pass region: Moffit, 15  
 Chisana-White River district: Capps, 16  
 Copper River region: Allen (H T), 86; Tarr (R S), 13a  
 glacial stages: Capps, 15f  
 Kenai Peninsula: Martin (G C), 15  
 Nabesna-White River district: Capps, 10c  
 Nelchina-Susitna region: Chapin, 18  
 northwestern: Smith (P S), 12  
 Pleistocene: Maddren, 05  
 Seward Peninsula: Brooks (A H), 01b  
 Turnagain-Knik region: Capps, 16a  
 Willow Creek district: Capps, 15b  
 Yakutat Bay region: Tarr (R S), 09  
 Yakutat Bay, Prince William Sound, and Copper River region: Tarr (R S), 14a  
 Alberta: Coleman, 10c; Dawson (G M), 83d  
 Athabasca-Churchill rivers region: Tyrrell, 96  
 Banff area: Ogilvie, 04  
 Bow and Belly rivers region: Dawson (G M), 85  
 northern: McConnell, 93  
 southwestern: Dawson (G M), 95c  
 Algonquin River: Gilbert, 96e  
 Alleghany Valley erosion: Williams (E H), 13  
 Alteration of glacial deposits by later ice invasions: Carney, 08b

## Glacial geology—Continued.

- Anticlinal ridges, postglacial: Gilbert, 86b  
 Arctic regions: Feilden, 77; Muir, 84, 17; Tarr, 97k; Davis Strait and Baffin Bay: Sutherland, 53  
 Arizona, glaciation: Johnson (D W), 10a; Merrill (F J H), 06a; Stone (G H), 01a; San Francisco Mountain: Atwood, 05  
 Atlantic Coastal Plain: Hollick, 94f  
 Baffin Land: Tarr, 97f  
 Basins in glacial lake deltas: Fairchild, 98c  
 Beaches at south end of Lake Michigan, origin: Wright (G F), 17a  
 Boulder clays, Great Plains, origin: Dawson (G M), 97b; microscopic structure: Dawson (G M), 85a  
 Boulders: Agassiz (L), 72a  
 British Columbia: Dawson (G M), 78d, 79a, 81c, 88c  
 Atlin district: Gwillim, 01, 02a  
 Cordillera: Dawson (G M), 90c  
 Golden-Kamloops: Daly (R A), 15  
 Finlay and Omenica rivers: McConnell, 96  
 Hedley district: Camsell, 10a  
 international boundary region: Daly (R A), 03b  
 Kamloops area: Dawson (G M), 95  
 northern: Dawson (G M), 81a  
 Queen Charlotte Islands: Dawson (G M), 80  
 southern interior: Dawson (G M), 79, 89d  
 Tulameen district: Camsell, 13  
 Vancouver area: Burwash, 18  
 Vancouver Island: Bauerman, 60; Clapp (C H), 13b, e; Lamplugh, 85  
 Cooke and Duncan areas: Clapp (C H), 17  
 northern part: Dawson (G M), 87  
 southern part: Clapp (C H), 14b  
 West Kootenay district: Dawson (G M), 90  
 California: Blake (J), 52  
 Coast Ranges: Holway, 11, 14c  
 Downieville quadrangle: Turner, 97  
 Johnson's Pass, Sierras: Blake (J), 76b  
 Klamath Mountains: Hershey, 03  
 Lake Mono region: Le Conte, 79; McGee, 85  
 Mohawk Valley: Turner, 91a  
 northwestern: Hershey, 03c  
 Pyramid Peak quadrangle: Lindgren, 96a  
 San Bernardino Range: Fairbanks, 10a  
 Sierra Costa Mountains: Hershey, 00b  
 Sierra Nevada Mountains: Le Conte, 73, 75; Manson, 13; Muir, 74b; Russell, 89  
 Truckee quadrangle: Lindgren, 97  
 Upper Kern Basin: Lawson, 04  
 Yosemite Valley: Andrews (E C), 10; moraines: Matthes, 14d
- Canada: Bell (R), 90a; Belt, 66; Bigsby, 51; Billings, 56l; Coleman, 99e; Crosskey, 66; Dawson (J W), 65a, c, 66b, c, 71a, 83e, 93; Hind, 64; Logan, 63; Lyell, 43; Ramsey, 59; Richardson (R), 84, 87; Upham, 91, 95; Wolff (W), 14  
 central: Dawson (G M), 75a  
 eastern: Chalmers, 89a  
 forty-ninth parallel: Dawson (G M), 75  
 glacial succession: Bell (R), 93b  
 interglacial periods: Coleman, 07  
 north central: Tyrrell, 98a



## Glacial geology—Continued.

- Canada: Northwestern: Tyrrell, 89b  
 Rocky Mountain region: Dawson (G M), 91a; Hector, 63  
 western: Coleman, 10f; Dawson (G M), 78e; Hector, 61  
 Champlain epoch: Hitchcock (C H), 95d; Upham, 95c, 99c  
 Champlain sea in Lake Ontario basin: Mather, 17a  
 Champlain submergence: Upham, 92d; and uplift: Taylor (F B), 98b  
 Champlain Valley, Pleistocene history: Baldwin, 94  
 Champlain-St. Lawrence Valley: Wright (G F), 98a  
 Changes of level, Pleistocene: Geer, 92a  
 Chenango Valley: Brigham, 97  
 Chronology of glacial period: Wright (G F), 08b, 16  
 Cincinnati ice dam: James (J F), 93c; Leverett, 91a; Wright (G F), 94b; White (I C), 84  
 Classification: Chamberlin (T C), 93e, 94g, 95a; McGee, 93c; Upham, 95a  
 Climatic conditions: Croll, 83; Dutton, 84c; Reeds, 15; Shaler, 90c; Upham, 95e, p, 94h; in St. Lawrence Valley: Adams (F D), 10c  
 Close of the ice age: McFarland, 93  
 Colorado: Henderson (J), 05, 10b  
 Arkansas Valley: Hayden, 76  
 Central City quadrangle: Bastin, 17  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Engineer Mountain quadrangle: Hole, 10  
 Estes Park: Wooster, 18  
 Gold Brick district: Crawford, 16  
 La Plata quadrangle: Cross, 99a  
 Las Animas Glacier: Stone (G H), 93a  
 Leadville quadrangle: Capps, 09  
 northwestern: White (C A), 78d  
 Pikes Peak sheet: Cross, 94  
 Platoro-Summitville district: Patton, 18  
 Rocky Mountain National Park: Lee (W T), 17a  
 Rocky Mountains: Cannon, 89  
 San Juan Mountains: Atwood, 11a, 12a, 18; Hills, 84; Hopkins, 10b  
 Sawatch Range: Capps 04; Davis (W M), 05  
 southern: Stevenson, 75  
 Telluride quadrangle: Cross, 99; Hole, 12a  
 Twin Lakes area: Westgate, 05  
 White River district: Endlich, 78  
 Complexity of glacial period: Keyes, 13g  
 Connecticut, New Haven region: Blake (W P), 83d; Dana (J D), 71, 71a, 83e  
 Woodstock: Eggleston, 02  
 Connecticut River valley, glacial flood: Hitchcock (C H), 83a  
 Connecticut Valley: Dana (J D), 81a; Fairchild, 14a; Hitchcock (C H), 92  
 glacial retreat: Dana (J D), 82  
 interglacial deposits: Hitchcock (C H), 00b  
 northern: Upham, 77  
 Connecticut Valley glacier: Dana (J D), 71e; Hitchcock (C H), 92  
 Contact plane between Nebraskan and Kansan drifts: Carman, 12

## Glacial geology—Continued.

- Continental elevation: Spencer (J W), 98h; Quaternary, date: Jukes-Browne, 90  
 Continental glacier, thickness: Smock, 83  
 Convection, influence on glaciation: Becker (G F), 84  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Cordilleran and Laurentide glaciation: Chalmers, 90b  
 Cordilleran region: Salisbury, 01a; Whitney, 80a  
 Correlation between America and Europe: Upham, 95h  
 Crazy Mountains of Montana: Mansfield, 09  
 Criteria for distinguishing glacial epochs: Alden, 09; Salisbury, 93a  
 Culmination of ice sheets: Leverett, 16a  
 Damming of streams: Dana (J D), 76a  
 Delavan lobe of Lake Michigan glacier: Alden, 04  
 Delaware Valley: Wright (A A), 93b  
 Depth of ice: Wright (G F), 83a  
 Discrimination of drift sheets, criteria for: Alden, 09; Salisbury, 93a  
 Distinct glacial epochs: Salisbury, 93a  
 Divisibility of glacial period: Chamberlin (T C), 93c  
 Divisions of glacial period: Hitchcock (C H), 95a; Upham, 95k  
 Drift, diversity along its boundary: Upham, 94f  
 erosion, transportation, and deposition: Upham, 00d  
 origin: Rogers (H D), 50e  
 southern limit, Atlantic States: Cook (G H), 79a  
 Drift and geologic time: Bannister, 97  
 Drift border, character: Chamberlin (T C), 84b  
 Drift deposits, classification: Chamberlin (T C), 91d; Newberry, 70h  
 Drift mounds: Bryson, 93a  
 Drift vegetation: Newberry, 74x  
 Driftless Area: Dana (J D), 78; Trowbridge, 15; deposits in: Sardeson, 97b  
 Drumlin formation: Alden, 11; Fairchild, 11a  
 Drumlins, distribution and origin: Taylor (F B), 07a; origin: Millis, 11  
 Drumlins and marginal moraines: Upham, 95c  
 Elevation of land: Dana (J D), 82  
 Englacial drift: Crosby, 96; Upham, 93d  
 distribution: Upham, 92b  
 Mississippi Valley: Upham, 99d  
 Epeirogenic movements: Upham, 93a, 99a  
 Epeirogenic uplift, wave-like progress: Upham, 94a  
 Erie basin: Leverett, 02  
 Erie clays, marine origin: Drummond, 74  
 Esker or kame drift: Kinahan (G H), 85  
 Eskers, origin: Crosby, 02  
 Field work: Leverett, 13  
 Fluctuations of glaciation: Upham, 98b  
 Forest bed, Iowa: McGee, 78  
 Fossil floras and glacial periods: Dawson (J W), 77h  
 Fresh-water shells in loess: Shimek, 04e



## Glacial geology—Continued.

- General: Agassiz (L), 72; Belt, 66, 78; Bouche-  
poin, 51; Burbank, 74; Chamberlin (T C),  
79, 80a, 84c, 86, 93d; Christy, 47, 48; Clay-  
ton, 76; Claypole, 93g; Coleman, 16; Dana  
(J D), 73f, 76d, 77, 84f, 93; Davis (W M),  
84, 84a; Dawson (J W), 61d, 82b; Desor,  
47, 47a, 48, 50, 50e, 51, 52, 52a, b, d, e, i, 53;  
Dewey, 43; Emmons (E), 47c; Fisher (C  
R), 94; Foster, 49d, 57; Frisbie, 80; Geikie  
(J), 91; Gilbert (G K), 87a; Gratacap, 78;  
Hall (J), 43i, j; Hay (O P), 18c; Hector,  
61a; Heilprin, 83b; Hitchcock (C H), 79a,  
81, 90b; Hitchcock (E), 42, 42a, 43, 43a,  
47b; Hobbs, 11e, 15; Hyatt, 68a; Jackson,  
43c, 66b, 71a; Kendall, 95; Lesley, 79b,  
82a; Leverett, 90a, 99, 14e; Lewis (H C),  
83i, j, 84, 86; Lewis (J F), 92; McGee, 82a;  
Maclaren, 42; Manson, 13, 17; Martins, 47;  
Mather, 41c; Meunier, 15; Miller (S A),  
75c; Millis, 11; Newberry, 69a, 82e, 83e, g,  
84d, e; Nicollet, 43b; Osborn, 15b; Perry,  
70a, 71, 72a; Price (E K), 76; Roberts, 16;  
Rogers (H D), 47, 47a; Rutland, 01;  
Salisbury, 02a; Shaler, 70, 81; Smyth  
(B B), 98a; Spencer (J W), 88d; Stevens  
(R P), 74a; Taylor (F B), 13c; Torrell, 77;  
Upham, 82, 84, 89, 89e, 91e, 92a, 94a, f, h,  
96, 97; Wallace, 94; Whitney, 80a; Whittle-  
sey, 66, 67; Wolff (W), 15; Wood, 77;  
Wright (G F), 84d, 89b, 90d, 92, 92a, d, g,  
93a, f, 94, 95b, 96, 11, 12a; Wright (W B),  
14
- Genesee Valley: Fairchild, 00g
- Glacial boundary: Wright (G F), 84, 90
- Glacial climate, cause: Dutton, 80a
- Glacial deposits: Reagan, 08a; Scott (W B),  
97d; metamorphism of: Carney, 09
- Glacial depression and postglacial uplift of  
northeastern America: Fairchild, 18a
- Glacial drift, inventory: Chamberlin (T C), 86;  
outer, western United States: Upham,  
04d
- Glacial drift sheets discriminated: Alden, 09
- Glacial epoch, second, terminal moraine:  
Chamberlin (T C), 83b
- Glacial erosion: Fairchild, 05; Tarr (R S), 93
- Glacial geology in America: Fairchild, 98
- Glacial grooves, Kelly's Island: Wright (G F),  
91b
- Glacial ice sheet, crushing effects: Tight, 91
- Glacial radiation, ice age: Claypole, 89
- Glacial sheet, extent and thickness: Agassiz  
(L), 72
- Glacial succession: Leverett, 15; Upham, 95e, h  
New England: Upham, 80a  
United States: Chamberlin (T C), 93g
- Glaciation, limit: Wright, 83c; Rocky Moun-  
tains: Geikie (A), 81
- Great Lakes region: Chamberlin (T C), 78a;  
Claypole, 77, 87; Emery (R), —; Leverett,  
02, 13a, 15; Lyell, 43; Newberry, 69a;  
Spencer (J W), 91b, 95c; Stroop, 70;  
Taylor (F B), 95d, 13; Upham, 94d, i,  
95, 96m, 05d

## Glacial geology—Continued.

- Great Plains, northern: Hayden, 62
- Greenland: Chamberlin (T C), 95; De Rance,  
76; Lindahl, 88; Salisbury, 96a; Sherwood  
90; Tarr (R S), 971
- limit of glaciation: Chamberlin (T C), 97
- Scoresby Sound region: Bay, 96
- southern: Wright (G F), 95
- Umanak district: Barton, 97
- west coast: Kornerup, 79, 81
- Green Mountains: Hitchcock (C H), 60a
- Gumbotil: Kay (G F), 16f
- Hawaii, Mount Kea: Bryan, 18
- Hudson-Champlain valley: Fairchild, 14a;  
Peet, 04
- Hudson River lobe of Laurentide ice sheet:  
Hitchcock (C H), 98a
- Ice accumulation: Upham, 95b
- Ice dams of lakes Maumee, Whittlesey, and  
Warren: Taylor (F B), 99
- Ice floes, Champlain period: Winchell (A),  
75a
- Ice lobes south of Wisconsin Driftless Area:  
Leverett, 96b
- Ice present during formation of glacial terraces:  
Gulliver, 08a
- Ice sheet, departure of: Upham, 94d  
eastern lobe: Hitchcock (C H), 97a  
southern edge, thickness: Smock, 80  
subsidence produced by: McGee, 81b  
thickness: McGee, 81a
- Ice-sheet erosion and deposition in Great Lakes  
region: Taylor (F B), 11b
- Ice sheets, growth, culmination, and departure:  
Upham, 90e
- Iceberg theory: Dobson, 44
- Idaho, central: Stone (G H), 00
- Cordilleran ice sheet: Stewart (C A), 13b  
northern: Hershey, 12  
western central: Lindgren, 00a
- Illinois: Andrews (E), 69; Bannister, 70;  
Bradley, 70; Broadhead, 71; Leverett, 99;  
Lewis (J F), 98; McAdams, 83, 84; McGee,  
79b; Rolfe, 03; Worthen, 66, 73a, 90
- Chicago area; Alden, 02; Andrews (E), 67;  
Guthrie, 96; Leverett, 97b; Salisbury,  
99a; Wright (G F), 18
- Cook Co.: Bannister, 68
- Danville quadrangle: Campbell (M R), 00
- Des Plaines Valley: Goldthwait, 09
- Florencia formation: Hershey, 97c
- forest bed: Leverett, 89b
- Galena and Elizabeth quadrangles: Shaw  
(E W), 16; Trowbridge, 16
- Illinois Valley: Barrows (H H), 10; Sauer, 16  
northern: Hershey, 96a, 97  
northwestern: Carman, 09; Hershey, 95  
older drift: Leverett, 93d
- Patoka quadrangle, Fuller, 04
- preglacial soils: Udden, 98c
- Rock River region: Swezey, 93
- southeastern: Hubbard (G D), 04
- Starved Rock State Park: Cady, 18
- Stephenson Co.: Hershey, 96c
- Wheaton quadrangle: Trowbridge, 12



## Glacial geology—Continued.

Indiana: Coulter, 84; Cox (E T), 79; Leverett, 96a, 97, 97a, 99a, 15; Newberry, 84a; Shannon, 12; Sutton, 82; Thompson (M), 89; Wood (H W), 16; Wright (G F), 84

Allen Co.: Dryer, 89

Bartholomew Co.: Elrod, 82

Benton Co.: Gorby, 86

Boone Co.: Gorby, 86a

Carroll Co.: Thompson (M), 92a

Clay Co.: Collett, 76a

Clinton Co.: Thompson (W H), 86

Danville quadrangle: Campbell (M R), 00

Dearborn Co.: Bigney, 16

Dearborn, Ohio, and Switzerland cos.: Warder, 72

Decatur Co.: Elrod, 83

Delaware Co.: Phinney, 82

Ditney quadrangle: Fuller, 02

Fayette Co.: Elrod, 84

Flatwoods region, Owen and Monroe cos.: Malott, 15

Grant Co.: Phinney, 84

Greene Co.: Van Gorder, 16

Hancock Co.: Brown (R T), 86

Harrison Co.: Collett, 79

Henry Co.: Phinney, 86

Huntington Co.: Cox (E T), 76

Jasper Co.: Collett, 83b; Purdue, 95

Jay Co.: McCaslin, 83

Jefferson Co.: Borden, 75a

Jennings Co.: Borden, 76

Johnson Co.: McCaslin, 84

Lagrange Co.: Dryer, 94

Lake Co.: Blatchley (W S), 98a

Lawrence Co.: Collett, 74a

Marion Co.: Brown (R T), 83

Maumee Valley: Gilbert, 71b

Miami Co.: Gorby, 89

Monroe Co., Bean Blossom Valley: Marsters, 02

Montgomery Co.: Collett, 76; Coulter, 83

Morgan Co.: Brown (R T), 84

Newton Co.: Collett, 83a

Noble Co.: Dryer, 94

north-central: Capps, 10b

northern: Levette, 74; Montgomery, 99a

northwestern: Barrett, 17

Owen Co.: Collett, 76

Patoka quadrangle: Fuller, 04

Porter Co.: Blatchley (W S), 98a

Putnam Co.: Collett, 80a

Randolph Co.: Phinney, 83

Richmond: Moore (J), 93b, 97

Ripley Co.: Borden, 76

Rush Co.: Elrod, 84b

Shelby Co.: Collett, 82a

southern: Veatch (A C), 98

Steuben Co.: Dryer, 92

Tippecanoe Co., Shawnee Mound: McBeth, 15; Wea Creek: McBeth, 02a

Vanderburgh Co.: Collett, 76

Vigo Co.: Scovell, 97; loess and sand dune deposits: McBeth, 16

Wabash Co.: Elrod, 92

Wabash Valley: McBeth, 00, 01

Wabash-Erie region: Dryer, 94a

## Glacial geology—Continued.

Indiana: Wayne Co.: Cox (E T), 79

western, boulder belts: McBeth, 01a

Whitley Co.: Dryer, 92

Interglacial beds, earliest: Coleman, 14c

Interglacial chronometer: Winchell (N H), 92f

Interglacial climate: Leverett, 90

Interglacial epochs: Chamberlin (T C), 92; Feilden, 78a

Interglacial periods: Coleman, 07, 15a; and changes of level: Coleman, 02h

Interglacial stages: Chamberlin (T C), 90

Iowa: Alden, 17; Bain, 04i; Calvin, 97f, 09a; Hay (O P), 14; Irish, 85; McGee, 79b; Shimek, 12b; Webster, 87; White (C A), 70

Aftonian beds: Shimek, 08b, 09, 10b

Aftonian gravels: Calvin, 05

Allamakee Co.: Calvin, 95a

Appanoose Co.: Bain, 96c

Benton Co.: Savage, 05a

Boone Co.: Beyer, 96

Buchanan Co.: Calvin, 98a

Buchanan gravels: Calvin, 96b

Buena Vista Co.: MacBride, 02

Burlington: Keyes, 88g

Butler Co.: Arey, 10

Camp Dodge region: Lees, 18

Carroll Co.: Bain, 99a

Cedar Co.: Norton, 01

Cerro Gordo Co.: Calvin, 97a

Cherokee Co.: MacBride, 02; Nebraskan drift: Carman, 13

Clay Co.: MacBride, 01

Clinton Co., Kansan and sub-Aftonian drift: Leighton, 16a

Council Bluffs region: Shimek, 11d

Crawford and Carroll cos.: Kay (G F), 17b, 18

Dallas Co.; Leonard, 98

Decatur Co.: Bain, 98a

Delaware Co.: Calvin, 98; McGee, 79

Des Moines, Capitol Hill, Pleistocene: Lees 16a

Des Moines, south from: Tilton, 13

Des Moines Co.: Keyes, 95d

Des Moines region: Tilton, 16; Wisconsin drift: Tilton, 15

Des Moines terrace, age: Tilton, 15a

Des Moines Valley: Lees, 16

Des Moines-Allerton section: Tilton, 13a

Dickinson Co.: MacBride, 00

drift, subdivisions: Calvin, 97c

drift sheets, map: Bain, 98d

Dubuque Co.: Calvin, 00

eastern: Carman, 09; McGee, 84

Elk Point quadrangle: Todd, 08

Emmet Co.: MacBride, 05

Fayette Co.: Savage, 05b

Fremont Co.: Udden, 03

Galena quadrangle: Shaw (E W), 10

glacial striæ: Norton, 11

glacial succession: Calvin, 97e

Grundy Co.: Arey, 10a

Guthrie Co.: Bain, 97c

Hamilton and Wright cos.: MacBride, 10

Hancock Co.: MacBride, 03

Hardin Co.: Beyer, 00



## Glacial geology—Continued.

Iowa: Harrison and Monona cos.: Shimek, 10  
 Henry Co.: Savage, 02  
 Humboldt Co.: MacBride, 99  
 Illinoian drift: Fultz, 95d  
 Iowa City: Shimek, 01b; post-Kansan glaciation: Leighton, 13  
 Iowa Co.: Stookey, 10  
 Iowan drift: Calvin, 99, 11a; Kay (G F), 16c; Leighton, 17b; Leverett, 13d  
 Jasper Co.: Williams (I A), 05  
 Jefferson Co.: Udden, 02  
 Johnson Co.: Calvin, 97; Webster, 88  
 Iowa River valley: Leighton, 16  
 post-Kansan glaciation: Leighton, 13a  
 Jones Co.: Calvin, 96  
 Kansan drift: Kay (G F), 16d  
 Keokuk region: Gordon (C H), 91  
 Kossuth Co.: MacBride, 03  
 Lamoni: Fitzpatrick, 98  
 Lee Co.: Keyes, 95c  
 Linn Co.: Norton, 95b  
 Little Sioux Valley: Carman, 12a  
 loess: Call, 81  
 Louisa Co.: Udden, 01  
 Lyon Co.: Wilder, 00  
 Madison Co.: Tilton, 97  
 Mahaska Co.: Bain, 95d  
 Marion Co.: Miller (B L), 01  
 Marshall Co.: Beyer, 97a  
 Mills Co.: Udden, 03  
 Missouri valley: Shimek, 10a, 11a  
 Monroe Co.: Beyer, 03  
 Montgomery Co.: Lonsdale, 95  
 Muscatine Co.: Udden, 99  
 Nebraskan drift: Shimek, 11c  
 north central: Webster, 88b  
 northeastern: McGee, 79a, 91, 93e  
 interglacial deposits: Calvin, 98b  
 sub-Aftonian till sheet: Beyer, 97b  
 northwestern: Bain, 99; Carman, 17; Wisconsin drift: MacBride, 02  
 O'Brien Co.: MacBride, 01  
 Osceola Co.: MacBride, 00  
 Page Co.: Calvin, 01  
 Palo Alto Co.: MacBride, 05  
 Plymouth Co.: Bain, 98b  
 Pocahontas Co.: MacBride, 05  
 Polk Co.: Bain, 97b; Tilton, 14  
 Pottawatamie Co.: Udden, 01a  
 Poweshiek Co.: Stookey, 10a  
 preglacial soils: Udden, 98c  
 Scott Co.: Norton, 99  
 Sioux Co.: Wilder, 00  
 Sioux Falls region: Shimek, 12a  
 southeastern: Leverett, 01  
 southwestern: White (C A), 67a; Aftonian and pre-Kansan: Bain, 98e  
 Story Co.: Beyer, 99b; buried loess: Beyer, 99c  
 Tama Co.: Savage, 03  
 Toledo lode of Iowan drift: Savage, 03a  
 Van Buren Co.: Gordon (C H), 95a  
 Wapello Co.: Leonard, 02  
 Warren Co.: Tilton, 96, 11  
 Washington Co.: Bain, 96a  
 Wayne Co.: Arsy, 10b

## Glacial geology—Continued.

Iowa: Webster Co.: Wilder, 02  
 western: St. John, 68a  
 Winnebago Co.: MacBride, 03  
 Woodbury Co.: Bain, 96b  
 Worth Co.: Williams (I A), 00  
 Iowan drift: Alden, 17; Calvin, 11a; Ogilvie, 16; Kay (G F), 16d; Leverett, 13d  
 Isostasy, relation: Salisbury, 94a  
 Kansan drift sheet, age: Hershéy, 01c  
 Kansas: Swallow, 66; Swem, 96; Todd, 13b, 18  
 Atchison Co.: Wilson (J W), 98  
 drainage of Kansas ice sheet: Todd, 09a  
 eastern: Wooster, 15  
 glacial striae: Wooster, 92  
 Leavenworth quadrangle: Hinds, 17  
 limit of drift: Wooster, 88a  
 northeastern: Hay (R), 93f  
 northern: Greene (F C), 10  
 Shawnee and Wabaunsee cos.: Smyth (B B), 98a  
 Shawnee Co.: Smyth (B B), 96a  
 Wakarusa Creek: Todd, 11a  
 Wisconsin deposits: Todd, 13c  
 Keewatin and Labrador glaciation areas: Upham, 13b  
 Keewatin and Laurentide ice sheets, Mississippi Valley: Elftman, 03b  
 Keewatin glacier: Tyrrell, 96b  
 Kentucky: Stevens (R P), 83; Wright (G F), 84  
 Boone Co.: Sutton, 77  
 Boyd Co., supposed glaciation: Wright (G F), 83b  
 Licking Valley: Squier, 83  
 moraine near Louisville: Bryson, 89a  
 Kettle holes and lakelets: Woodworth, 93  
 Kettle Moraine: Chamberlin (T C), 78a  
 Labrador: Heilprin, 85d; Packard (A S), 65, 67; Tarr (R S), 97f; Wright (G F), 95  
 northeastern coast: Hind, 77  
 western: Low, 93a  
 Lafayette or Ozarkian uplift, relation to glaciation: Upham, 97b  
 Lake basins: Hind, 64; New England, origin: Shaler, 66b  
 Lake Erie, beaches and moraines: Leverett, 98b; preglacial outlet to Lake Ontario: Spencer (J W), 81  
 Lake Michigan glacier: Guthrie, 90  
 Lake ridges, Ohio: Wright (G F), 90d  
 Lake Superior region: Agassiz (L), 49a, 50a; Crozier, 86; Desor, 51e; Leverett, 10h; Martin (L), 11a; Van Hise, 11  
 Land elevation and ice accumulation in Quaternary: Le Conte, 91a  
 Laurentian basin, geological history: Russell, 93c  
 Laurentian ice sheet, southern lobe: Hitchcock (C H), 98b  
 Laurentide Glacier: Dawson (G M), 97c  
 Leaching of Pleistocene drifts, Iowa: Leighton, 15  
 Literature: Leverett, 03  
 Local origin of glacial drift: Salisbury, 00a  
 Loess, associated interglacial deposits: Shimek, 06  
 in Wisconsin drift: Salisbury, 96b



## Glacial geology—Continued.

- Loess: Iowan drift: Shimek, 04b  
 Mississippi Valley: Shimek, 08a  
 Natchez, Miss.: Shimek, 02  
 origin and age: Savage, 16c  
 relations to drift: Keyes, 12
- Maine: Agassiz (L), 67a; Hitchcock (C H), 61;  
 Packard (A S), 67; Stone (G H), 80, 83, 99  
 Androscoggin Glacier: Stone (G H), 80a  
 coast: Shaler, 74a  
 Eastport quadrangle: Bastin, 14  
 moraines: Stone (G H), 87  
 Mount Desert Island: Shaler, 89a  
 Mount Katahdin: Curtis, 15c; De Laski, 72;  
 Hamlin (C E), 81; Tarr (R S), 00  
 Penobscot Bay region: De Laski, 64  
 southern: DeLaski, 62  
 Vinal Haven Island: De Laski, 61  
 Waterville: Little (H P), 17a
- Manitoba: Dawson (G M), 75a; McInnes, 13a;  
 Tyrrell, 91c, 93a, 16  
 Assiniboine valley: Bryce, 91  
 Birds Hill, esker near Winnipeg: Upham, 10  
 Hudson Bay Railway: Johnston (W A), 18  
 Lake Winnipeg region: Dowling, 00a; Tyrrell,  
 00  
 Lake Winnipeg-Burntwood River region:  
 Dowling, 02; Tyrrell 02  
 Red River valley: Bryce, 91  
 southeastern: Wallace (R C), 17a  
 southern: Upham, 90  
 Wekusko Lake area: Alcock, 18  
 western: Tyrrell, 88, 92
- Map of North America during great ice age:  
 Chamberlin (T C), 13
- Marine shells in drift: Redfield, 47
- Massachusetts: Emerson (B K), 17; Hitchcock  
 (E), 33, 41, 53a, 57; Upham, 91f; Wood-  
 worth, 98; Wright (G F), 81  
 Berkshire Co.: Emerson (B K), 99; Taylor  
 (F B), 03, 03a  
 Boston area: Brown (R M), 02a; Desor, 51b;  
 Upham, 79a  
 Boston Basin, Blue Hills area: Crosby, 00  
 Lake Bouvé: Grabau, 00  
 pre-Wisconsin drift: Wentworth, 15  
 Cape Ann: Shaler, 89b  
 Cape Cod area: Julien, 00b; Shaler, 98a;  
 Upham, 79b  
 Charles River basin: Clapp (F G), 01, 04  
 Charles River region: Crosby, 03b  
 Connecticut Valley: Jefferson, 98  
 eastern: Crosby, 77; Dodge (W W), 75;  
 Fuller, 98; 01a, 04e  
 Elizabeth Islands: Hall, 78c  
 Essex Co.: Gregory (J J H), 64c; Sears, 05  
 Gloucester: Shaler, 66d  
 Green Mountains: Hitchcock (C H), 60a  
 Hampshire area: Emerson (B K), 95b  
 Hampshire Co.: Emerson (B K), 98  
 Hingham: Bouvé, 91; Crosby, 92a, 94  
 Holyoke quadrangle: Emerson (B K), 98a  
 Lowell: Street, 88  
 Marthas Vineyard: Bryson, 93; Hitchcock  
 (E), 24; Hollick, 93b; Shaler, 88; Wood-  
 worth, 97, 00a  
 Merrimac Valley: Wright (G F), 77

## Glacial geology—Continued.

- Massachusetts: Middlesex Co.: Barton (G H), 89  
 Nantasket district: Crosby, 93  
 Nantucket Island: Curtis, 99; Wilson (J H),  
 05; Shaler, 89c  
 Narragansett Basin: Shaler, 99  
 Nashua Valley, Crosby, 03c  
 Newtonville sand plain: Gulliver, 93  
 parallel ridges of glacial drift: Shaler, 70  
 pre-Wisconsin till: Fuller, 01  
 Richmond and Great Barrington boulder  
 trains: Taylor (F B), 10b  
 Richmond boulder trains: Benton, 78; Lyell,  
 55a; Rogers (H D), 46a; Taylor (F B), 10b  
 southeastern: Shaler, 96  
 Westfield: Diller, 77
- Metamorphism of glacial deposits: Carney, 09
- Mexico, Sonora: Merrill (F J H), 06a
- Michigan: Gordon (C H), 98; Hobbs, 11c; Lane,  
 09a; Leverett, 01a, 15, 17; Taylor (F B), 11b  
 Alcona Co.: Leverett, 02a  
 Ann Arbor quadrangle: Russell (I C), 08  
 Camp Custer region: Leverett, 18  
 central: Mudge, 95  
 Detroit district: Sherzer, 17; Taylor (F B),  
 97g  
 Drumlin areas: Leverett, 06; Russell, 06,  
 07b  
 eastern: Taylor (F B), 96d  
 Grand Rapids area: Leverett, 04b  
 Grand Traverse region: Leverett, 05a, 06  
 Winchell (A), 66  
 Huron Co.: Lane, 00  
 Iron River district: Allen (R C), 10  
 Lake Whittlesey and Arkona beaches: Taylor  
 (F B), 05a  
 Lapeer Co.: Taylor (F B), 02  
 Marquette region: Davis (C A), 07b  
 Lower Peninsula: Leverett, 04a; Winchell  
 (A), 65a  
 Menominee, Dickinson, and Iron cos.: Russell  
 07  
 Monroe Co.: Sherzer, 00  
 Raised beaches of Lake Michigan: Goldthwait,  
 06  
 Saginaw basin: Leverett, 18b; Pleistocene  
 beaches: Cooper (W F), 08  
 southeastern: Sherzer, 02; Taylor (F B), 96c,  
 97a  
 Tuscola Co.: Davis (C A), 09c  
 Upper Peninsula: Leverett, 11; Rominger, 73;  
 Russell, 05a; copper region: Foster, 50a  
 Walnut Lakes: Davis (C A), 08a  
 Washtenaw Co.: Winchell (A), 81a  
 Wayne Co.: Sherzer, 13
- Minnesota: Kloos, 77; Leverett, 14; Sardeson,  
 11; Upham, 81, 83, 96f, 06, 13a; Winchell  
 (N H), 73a  
 Aitkin Co.: Upham, 99  
 Becker Co.: Upham, 88  
 Beltrami Co.: Todd, 99a  
 Beltrami Island of Lake Agassiz: Upham, 93l  
 Benton and Sherburne cos.: Upham, 88  
 Bigstone and Lac qui Parle cos.: Upham, 84  
 Blue Earth Co.: Upham, 84  
 Brown and Redwood cos.: Upham, 84  
 Carlton Co.: Winchell (N H), 99a



## Glacial geology—Continued.

Minnesota: Carver and Scott cos.: Upham, 88  
 Cass Co.: Upham, 99  
 central and western: Upham, 80  
 Chisago, Isanti, and Anoka cos.: Upham, 88  
 Clay Co.: Upham, 88  
 Cottonwood and Jackson cos.: Upham, 84  
 Crow Wing and Morrison cos.: Upham, 88  
 Dakota Co.: Winchell (N H), 88a  
 Dodge Co.: Harrington (M W), 76, 84  
 Douglas and Pope cos.: Upham, 88  
 eastern: Upham, 84d  
 Fargo quadrangle: Hall (C M), 05  
 Faribault Co.: Upham, 84  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Freeborn Co.: Winchell (N H), 75b, 84a  
 Goodhue Co.: Winchell (N H), 88a  
 Grant and Stevens cos.: Upham, 88  
 Hennepin Co.: Winchell (N H), 77b, 88a, 93g  
 Houston Co.: Winchell (N H), 77a, 84a  
 Hubbard Co.: Todd, 99a  
 Itasca Co.: Culver, 94; Grant (U S), 99  
 Itasca Lake region: Upham, 91h  
 Kandiyohi and Meeker cos.: Upham, 88  
 Keewatin and Laurentide ice sheets: Elftman, 03c  
 Lake Agassiz: Upham, 84b  
 Lake Superior region: Whittlesey, 66a  
 Le Sueur Co.: Upham, 84  
 Little Falls: Upham, 84c, 88a  
 McLeod Co.: Upham, 88  
 Mankato: Bechdolt, 89  
 Marshall, Roseau, and Kittson cos.: Todd, 99a  
 Martin Co.: Upham, 11b  
 Mille Lacs and Kanabec cos.: Upham, 88  
 Minneapolis: Soper, 15; Upham, 00b  
 Minneapolis-St. Paul district: Sardeson, 16  
 Minnesota Valley: Winchell (N H), 74b  
 Mower Co.: Winchell (N H), 75c, 84a  
 Murray and Nobles cos.: Upham, 84  
 Norman and Polk cos.: Todd, 99a  
 northeastern: Leverett, 17a; Upham, 94;  
     Keweenawan area: Elftman, 98  
 northwestern: Leverett, 15a; Todd, 93  
 Olmsted Co.: Harrington (M W), 76, 84  
 Otter Tail Co.: Upham, 88  
 Pine Co.: Upham, 88  
 Pipestone Co.: Winchell (N H), 78d  
 Pipestone and Rock cos.: Winchell (N H),  
     84a  
 Ramsay Co.: Winchell (N H), 78c, 88a  
 Renville Co.: Upham, 88  
 retreat of ice margin: Winchell, (N H) 01e  
 Rice Co.: Winchell (N H), 84a  
 Rock Co.: Winchell (N H), 78d  
 St. Anthony Falls region: Winchell (N H),  
     78e  
 St. Croix Dalles: Berkey, 97; Chamberlin (R  
     T), 05  
 Saint Croix Valley: Upham, 00  
 St. Louis Co.: Winchell (N H), 99a  
 Sangamon interglacial stage: Upham, 13a  
 Sibley and Nicollet cos.: Upham, 88  
 southern: Hall (C W), 11a; Hurlbut, 70  
 Stearns Co.: Upham, 88  
 Steele Co.: Harrington (M W), 76, 84  
 Swift and Chippewa cos.: Upham, 88

## Glacial geology—Continued.

Minnesota: Wabasha Co.: Winchell (N H), 88a  
 Wadena and Todd cos.: Upham, 88  
 Waseca Co.: Upham, 84  
 Washington Co.: Winchell (N H), 88a  
 Watonwan and Martin cos.: Upham, 84  
 Wilkin and Traverse cos.: Upham, 88  
 Winona Co.: Winchell (N H), 84a  
 Wright Co.: Upham, 88  
 Yellow Medicine, Lyon and Lincoln cos.: Up-  
     ham, 84  
 Minnesota River: Warren (G K), 75  
 Mississippi River, lower rapids: Leverett, 99c  
 Mississippi Valley: Andrews (E), 69; Cham-  
     berlin (T C), 93; McGee, 79b; Newberry,  
     69a  
 Keewatin and Laurentide ice sheets: Elft-  
     man, 03b  
 Pleistocene crustal movements: Todd, 13  
 upper: Dana (J D), 93; Warren (G K), 68  
 Missouri: Branson, 18a; Broadhead, 71, 73e;  
     Gallaher, 00; Todd, 94a, 96a  
 Jackson Co.: McCourt, 17  
 Kansas City: Case, 94a  
 Leavenworth quadrangle: Hinds, 17  
 Macon Co.: McGee, 88b  
 St. Louis area: Drushel, 11; Wheeler, 95  
 Saline Co.: Meek, 73c  
 sand boulders: Spencer (J W), 87d  
 silver in glacial material: Tarr (W A), 15a  
 Smithville quadrangle: Hinds, 17  
 Tuscumbia boulders: Wright (G F), 03e  
 Missouri River (upper) region: White (C A), 83l  
 Missouri Valley: Wright (G F), 03d, 04  
 Montana: Davis (W M), 17c; White (C A), 84c  
 Castle Mountain district: Weed, 96a  
 Clark Fork region: Davis (W M), 14b  
 Cliff Lake region: Mansfield, 11  
 Crazy Mountains: Mansfield, 08a, 09  
 glacial lake Missoula: Pardee, 10a  
 Glacier National Park: Alden, 12, 13, 14, 14a  
 Keewatin ice sheet Montana lobe: Calhoun,  
     06  
 Mission Range: Davis (W M), 16b  
 northern and central: Mortson, 76  
 northwestern: Culver, 92  
 Sun River region: Stebinger, 17b  
 western: Hershey, 12; Wood (H R), 92b  
 Yellowstone Valley: Weed, 93  
 Morainial ridges, southern New England:  
     Merrill (F J H), 86a  
 Moraines, eastern and western, correlation:  
     Chamberlin (T C), 82  
     rhythmic accumulation: Upham, 97c  
     terminal: Upham, 79  
 Moraines and beaches, Lake Erie: Spencer  
     (J W), 98b  
 Moraines and maximum diurnal temperature:  
     Todd, 01b  
 Moraines of recession: Taylor (F B), 97b  
 Nebraska: Aughey, 76, 80; Barbour, 03; Hicks,  
     90a; Todd, 89  
 Aftonian beds: Shimek, 10b  
 Jefferson Co.: Carmony, 03  
 Kansan drift: Barbour, 14g  
 Missouri Valley: Shimek, 10a  
 northeastern: Todd (J E), 12



## Glacial geology—Continued.

- Nebraska: Omaha region: Shimek, 11d  
southeastern: Barbour, 00a  
New Brunswick: Chalmers, 85a, 89, 95a, 00a;  
Hind, 65; Matthew (G F), 72  
Andover sheet: Chalmers, 02  
Bathurst: Paisley, 74  
central and eastern: Chalmers, 93  
Chaleur Bay region: Chalmers, 81, 82  
eastern: Chalmers, 91, 92, 95  
Fredericton sheet: Chalmers, 02  
Gloucester Co., marine clays: Paisley, 73  
northeastern: Chalmers, 88  
northern: Chalmers, 87, 87a  
northwestern: Bailey (L W), 88; Chalmers, 01  
southern: Chalmers, 90, 90a; Matthew (G F),  
79a  
western: Chalmers, 85  
New England: Clapp (F G), 08; Dana (J D),  
57, 71e, f, 73c, 77, 83, 93; Desor, 47a, 48;  
Hitchcock (C H), 79a, 93a; Hollick, 94f;  
Packard (A S), 73; Perry (J B), 71, 72a;  
Stone (G H), 81; Upham, 89  
glacial recession in: Taylor (F B), 10  
high-level gravels: Hitchcock (C H), 95c  
moraines: Hitchcock (C H), 92a  
northeastern: Clapp (F G), 08  
southern: Dana (J D), 75e  
terminal moraines: Hitchcock (C H), 92a  
New England islands: Upham, 99e  
Newfoundland: Chamberlin (T C), 95b; Kerr,  
70; Murray, 66, 83; Wright (G F), 95  
New Hampshire: Hitchcock (C H), 78a; Up-  
ham, 77c, 78  
Androscoggin Glacier: Stone (G H), 80a  
Cheshire Co.: Tenney, 78  
Coos Co.: Huntington, 78  
Hebron: Ball (J), 32  
Jackson moraine: Foshay, 14  
Lost River: Goldthwait, 15b  
Merrimac Valley: Upham, 77b  
Mount Kearsarge: Putnam, 85  
Mount Lafayette: Hitchcock (E), 52  
Mount Monadnock: Wheelock, 73  
Mount Washington: Goldthwait, 13; Hitch-  
cock (C H), 76  
White Mountains: Agassiz (L), 70; Gold-  
thwait, 13, 13a, 16; Guyot, 50; Hitchcock  
(C H), 78g, 93; Johnson (D W), 17;  
Packard (A S), 67, 67a; Upham, 04;  
Vose, 68, 68a  
Newington moraine, New England: Katz, 17  
New Jersey: Britton (N L), 87b; Cook (G H),  
77, 78, 80; Kümmel, 09; Salisbury, 92, 93,  
94, 95, 96, 97, 98, 02; Smock, 83  
extra-morainic drift: Salisbury, 92a; Wright  
(G F), 93d  
glaciation limit: Wright (A A), 93a  
Hudson Co.: Russell, 80a  
Lake Passaic: Cook (G H), 80  
New York City district: Merrill (F J H), 02  
Palisade ridge: Peet, 94  
Raritan quadrangle: Bayley, 14  
Trenton: Lewis (H C), 81; Volk, 11; Wood-  
man, 11; Woodworth, 11a; delta deposits  
Wright (G F), 98b  
Trenton gravel, Crow Creek: Wright (G F), 11

## Glacial geology—Continued.

- New Mexico: Stone (G H), 01a  
New York: Carney, 07a; Clarke (J M), 08;  
Fairchild, 09a, 12a, 13, 16a; Jones (C C),  
07; Ramsay, 59; Spencer (J W), 12a;  
Upham, 89  
Abandoned shore lines: Woodworth, 07a  
Adirondacks: Alling, 16; Johnson (D W), 17;  
Miller (W J), 09a, b, 17a; Ogilvie, 02;  
central: Fairchild, 09  
Black and Mohawk valleys: Fairchild, 12  
Block Island: Hollick, 98d  
Blue Mountain quadrangle: Miller (W J), 17  
Camp Upton region: Alden, 18b  
Catskill Mountains: Johnson (D W), 17;  
Rich, 06, 15b, 17b, 18; Smock, 85  
Catskill Valley: Chadwick, 10a  
Cayuga Lake valley: Nevius, 99a  
central: Tarr, 05b  
Champlain Valley: Ogilvie, 02; Peet, 04;  
Woodworth, 05a  
Chautauqua region: Edson, 84  
Chenango Valley: Brigham, 97  
Clinton Co.: Cushing, 97; Kellogg, 92  
Clove Valley Pleistocene lake basin: Grata-  
cap, 01a  
Crown Point region: Barker, 16; glacial pot-  
holes: Barker, 13  
drumlin structure and origin: Fairchild,  
07a, f  
east central: Rich, 14  
eastern: Wright (G F), 95a  
Elizabethtown and Port Henry quadrangles:  
Kemp, 10c  
Erie Co.: Houghton (F), 14  
Essex Co.: Kemp, 97  
Finger Lake region: Carney, 07; Dryer, 04;  
Fairchild, 99a; Lincoln, 92; Matson, 04;  
Rich, 08; Watson, 99  
Fishers Island: Fuller, 05r  
Genesee Falls: Grabau, 07e  
Genesee Valley: Fairchild, 08; Rogers (B), 93  
Gilbert Gulf: Fairchild, 07c  
Honeoye-Irondequoit kame moraine: Dryer,  
08  
glacial drainage: Fairchild, 04e  
glacial waters, Oneida to Little Falls: Fair-  
child, 04b; west and south of Adirondacks:  
Fairchild, 09c  
Hudson Valley: Jones (R W), 16; Merrill  
(F J H), 91a; Peet, 04; upper: Fairchild,  
16b, 17  
Hudsonian and Ontarian glacier lobes: Fair-  
child, 09b  
interglacial deposits: Baker (F C), 13  
Irondequoit Valley: Chadwick, 17; Dryer, 90  
Iroquois extinction: Fairchild, 07g  
Ithaca region: Foote (C W), 77; interglacial  
gorges: Rich, 15a  
Jefferson Co.: Lloyd, 76  
Keuka Valley: Carney, 07b  
Lake Erie basin: Fairchild, 07  
Lake George region: Wright (G F), 95a  
Lake Pleasant quadrangle: Miller (W J), 16a  
Lewis Co.: Bendrat, 08  
Little Falls quadrangle: Cushing, 05



## Glacial geology—Continued.

New York: Long Island: Bryson, 83, 85, 91, 93, 95; Crosby, 00a, 08; Dana (J D), 87d; Fairchild, 17a; Fuller, 03f, h, 14; Hollick, 94e, 96c; Lewis (E), 77b; Merrill (F J H), 86; Upham, 99e; Veatch (A C), 03, 03a; Camp Mills region: Alden, 18a; Good Ground: Bryson, 96

Long Island Sound: Dana (J D), 90h

Long Lake quadrangle: Cushing, 07

Manhattan Island: Julien, 06b

Mohawk glacial lobe: Brigham (A P), 11

Mohawk Valley: Brigham (A P), 98a; Dana (J D), 63a

Monroe Co.: Fairchild, 95f

Mooers quadrangle: Woodworth, 05

Moravia quadrangle: Carney, 09c

moulin potholes: Julien, 10

multiple glaciation: Fairchild, 09a

Nassau Co.: Woodworth, 01

New York district: Merrill (F J H), 02; Wilson (J H), 06a

Niagara quadrangle: Kindle, 13c

North Creek quadrangle: Miller (W J), 14a

northern: Stevens (R P), 73; Willcox, 84

Ogdensburg region: Cushing, 16

Oneida Co.: Brigham, 89

Orange Co.: Ries, 97b

outwash drift: Carney, 07c

overflow channel of ponded pre-Wisconsin waters: Carney, 08

Overlook Mountain: Stevens (N E), 12

Portage Dam site: Grabau, 09g

Port Leyden quadrangle: Miller (W J), 10

Poughkeepsie quadrangle: Gordon (C E), 11

pre-Iroquois channels: Fairchild, 03b

Remsen quadrangle: Miller (W J), 09

Richmond and Great Barrington boulder trains: Taylor (F B), 10b

Richmond Co.: Britton (N L), 81a

Rochester district: Fairchild, 95b; Giles, 18a

Rondout Valley: Ries, 00c

Saratoga quadrangle: Stoller, 16

Saratoga Springs region: Cushing, 14

Schenectady quadrangle: Stoller, 11

Seneca and Cayuga valleys: Tarr, 05a

Seneca Co.: Lincoln, 97

Shawangunk Mountain: Julien, 85

southeastern: Berkey, 11; Mather, 43

Staten Island: Britton (N L), 87b; Hollick, 86a, 98c, g, 99, 99a; boulders: Gratacap, 99b; Hollick, 15a

Syracuse region: Fairchild, 05a

terminal moraine: Lewis, 84

Thousand Islands region: Cushing, 10a

Tompkinsville: Britton (N L), 86a

Watkins Glen-Catatonk district: Williams (H S), 09

western: Fairchild, 97b, c, 02; Gilbert, 99a; Hall, 43; Johnson (L), 82; Taylor (F B), 12a

Niagara Gorge and Great Lakes history: Taylor (F B), 13d

Niagara region: Belt, 75; Taylor (F B), 98; Upham, 98

Niagara River: Wright (G F), 84b; relation to glacial period: Spencer (J W), 10b

## Glacial geology—Continued.

Nipissing-Mattawa River, outlet of Nipissing Great Lakes: Taylor (F B), 97d

Nomenclature and succession: Chamberlin (T C), 96a, 10

North America: Chamberlin (T C), 94a; Leverett, 08; Newberry, 86d; Wright (G F), 81b, 89; northeastern: Fairchild, 18; Torell, 78

North American and European glacial deposits, comparison of: Deeley, 13; Leverett, 10

North Dakota: Leonard, 04a, 06d, 13; Leverett, 13e; Todd, 85, 96; Upham, 96f; White (C A), 84c; Willard, 02, 04, 04d, 06e

Barnes Co., eskers and kames: Hard, 13a

Bismarck quadrangle: Leonard, 12

Casselton quadrangle: Hall (C M), 05

Devils-Stump lake region: Simpson (H E), 12

Fargo quadrangle: Hall (C M), 05

Jamestown-Tower district: Willard, 09

Lake Agassiz: Hall (C M), 04

pre-Wisconsin drift: Leonard, 16a

Tower quadrangle: Willard, 06a, f, g

western: Leonard, 16

Northern Pacific railroad: Newberry, 85a

Northwest: Winchell (N H), 73d

Northwest Territory: Keele, 10; Tyrrell, 94

Hudson Bay region: Tyrrell, 97

Tazin and Talston rivers: Camsell, 16

Winisk and upper Attawapiskat rivers regions: McInnes, 09a

Nova Scotia: Belt, 66; Goldthwait, 14d; Honeyman, 77, 82, 83a, 88e, h, 85; Silliman (jr), 64a; Woodman, 99c

Antigonish Co.: Honeyman, 86b

Cape Breton: Fletcher, 85; Honeyman, 90, 90a

eastern: Fletcher, 87

Halifax and Colchester cos.: Honeyman, 88c

Halifax Co.: Hare, 81

Halifax Harbor: Honeyman, 86c

Halifax region: Honeyman, 76b, 86

Kings Co.: Coldwell, 96

Lunenburg: Prest, 96

northwestern: Chalmers, 95

Pictou coal field: Poole, 90

Point Pleasant: Cameron, 81

Shelburne Co.: Powers, 15a

southwestern: Bailey (L W), 91, 98

Ohio: Carney, 10c; Claypole, 87; Leverett, 92a, 97; McClure, 04; Newberry, 71, 74, 78; Whittlesey, 48; Wright (G F), 83, 84, 88, 90c

Akron: Claypole, 92

Amboy: Wright (G F), 98c

ancient finger lakes: Hubbard (G D), 08a

Ashland Co.: Read, 78a

Ashtabula, Lake, Geauga, and Trumbull cos.: Read, 73

Ashtabula quadrangle: Carney, 16b

Brilliant gravel, age: Chamberlin (T C), 96; Wright (G F), 96a

Bellevue quadrangle: Carney, 13

Butler Co.: Orton, 78

Camp Sherman region: Campbell (M R), 18

central: Leverett, 99d

Cincinnati region: Fenneman, 16



## Glacial geology—Continued.

Ohio: Clinton Co.: Hussey, 78  
 Columbus esker: Morse, 07  
 Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Cuyahoga Valley: Newberry, 73a; Upham, 96a, b  
 Darke Co.: Lindemuth, 78  
 Dayton: Foerste, 15; esker group south of: Scheffel, 08  
 Fayette Co.: Hussey, 78  
 forest, interglacial: Locke, 43a  
 Franklin Co.: Orton, 78a  
 glacial boundary: Wright (G F), 84a  
 glacial succession: Leverett, 93  
 Hanover glacial dam: Carney, 07d  
 Huron Co.: Read, 78  
 Kelleys Island: Carney, 09e, 10; Whittlesey, 79  
 Knox Co.: Read, 78  
 Lake Erie: Whittlesey, 50  
 Lake Maumee: Carney, 11c; Taylor (F B), 11a  
 Licking Co.: Carney, 06a, 09; Mather, 09; Scheffel, 09; Tight, 94b  
 Logan Co.: Hill (F C), 78  
 Lorain Co.: Newberry, 74b  
 Loveland region: Leverett, 92b  
 Madison Co.: Orton, 78  
 Maumee Valley: Gilbert, 71d, 73  
 Miami Co.: Hussey, 78  
 northwestern: Winchell (N H), 73c  
 Oberlin quadrangle: Carney, 10a, 16a  
 peat bed beneath drift: Orton, 70  
 Preble Co.: Orton, 78  
 Richland Co.: Read, 78  
 Shelby Co.: Hussey, 78  
 southeastern: Andrews (E B), 71a, 74  
 southern: Andrews (E B), 60; Stout, 16  
 southwestern: Leverett, 93a  
 Spring Valley gorge: Scheffel, 07  
 Summit Co.: Newberry, 73a  
 terminal moraine: Wright (G F), 83  
 Ohio Valley: Wright (G F), 84c; upper: Wright (G F), 93b  
 Ontario: Chapman (E J), 61; Dawson (J W), 61d; Murray, 54a; Wilkins, 76; Willcox, 84  
 Algonquin and Nipissing shore lines: Goldthwait, 09b, 10  
 Algonquin beach: Johnston (W A), 13  
 central: Wilson (A W G), 01  
 Don Valley: Upham, 01a  
 drift deposits: Coleman, 09c  
 Dundas Valley: Kennedy, 84  
 eastern: Ells, 04d  
 French River sheet: Bell (R), 98  
 Galt moraine: Taylor (F B), 99a  
 Georgian Bay moraines: Taylor (F B), 98a  
 Hamilton region: Spencer (J W), 75  
 Hastings Co.: Chapman (E J), 60e  
 Hunters Island: Smith (W H C), 92a  
 Iroquois Beach: Coleman, 04c; Spencer (J W), 90c  
 Kingston area: Baker (M B), 16  
 Kingston-Lake Simcoe region: Murray, 54  
 Lake Ojibwa: Coleman, 09b, 10e  
 Lake Ontario, western end: Spencer (J W), 82a

## Glacial geology—Continued.

Ontario: Lake Ontario region: Spencer (J W), 88b, 92b; Wilson (A W G), 05a  
 Lake Superior region: Bigsby, 52a  
 Lake Wendigokan region: Moore (E S), 09c  
 Lincoln Co.: Wilkins, 91  
 London area: Stansfield, 16  
 Mattagami basin: Baker (M B), 11  
 Mattawa Valley: Taylor (F B), 97f  
 Moose River basin: Bell (J M), 04  
 moraine of retrocession: Wright (G F), 90a  
 Nipigon Basin: Wilson (A W G), 10  
 Nipissing region: Taylor (F B), 94  
 northern: Tyrrell, 98a  
 Nottawasaga Valley: Fleming, 53  
 Onaman iron range: Moore (E S), 09b  
 Ottawa region: Ami, 87a; Bowman (A), 88a; Ells, 98c; Grant (J A), 64; Johnston (W A), 16b, 17; Wilson (W J), 98  
 Patricia district: Tyrrell, 13  
 Patrician glacier: Tyrrell, 13b  
 Porcupine: Hore, 12a  
 Rainy Lake region: Lawson, 88  
 Rainy River district: Johnston (W A), 14a, 15, 16c  
 Red Lake region: Dowling, 96  
 Seine River and Lake Shebandowan areas: McInnes, 99  
 Severn River headwaters: Camsell, 05  
 Simcoe area: Johnston (W A), 10, 11; Taylor (F B), 97i  
 Simcoe Co.: Hunter, 03  
 southwestern: Murray, 57b; Taylor (F B), 09, 10a, 12; moraines: Taylor (F B), 13c  
 Toronto: Coleman, 94, 95a, 97c, 01d, 04b, 13c, e, j, 14b; Fleming, 61; Hind, 53; Hinde, 77  
 Don River deposits: Wright (G F), 14  
 interglacial period, duration: Coleman, 02f  
 Lake Iroquois: Coleman, 99f  
 moraines: Taylor (F B), 13b  
 upper lakes region: Coleman, 99  
 Oregon, central: Russell, 05  
 Original ice structures preserved in unconsolidated sands: Berkey, 11a  
 Ozarkian epoch: Hershey, 96d  
 Pacific region: Clayton, 76; Dawson (G M), 78c; Packard (A S), 77a; Wright (G F), 87a  
 Pennsylvania: Hice, 12; Lesley, 83e; Lewis (H C), 85b  
 Beaver quadrangle: Woolsey, 05  
 Beaver Valley: Foshay, 90a  
 Blue Mountains: Hall (C E), 76  
 Chenango Valley: Brigham, 97  
 Crawford Co.: White (I C), 81  
 eastern: Williams (E H), 93a, 94a, 95  
 Elkland quadrangle: Fuller, 03a  
 Erie Co.: White (I C), 81  
 extramorainic drift: Williams (E H), 94; Wright (G F), 93g  
 first phase of glaciation: Williams (E H), 17  
 fossils in glacial drift: Millward, 09  
 Gaines quadrangle: Fuller, 03  
 glacial border, recent date: Wright (G F), 13  
 glacial dam in Allegheny River: Wright (G F), 14a  
 glaciation (supposed) south of terminal moraine: Lewis (H C), 84 a



## Glacial geology—Continued.

- Pennsylvania: Kansan drift: Williams (E H), 96b, 98  
 Kansan glacial border: Williams (E H), 96a  
 Lackawanna-Wyoming region: Branner, 87, 87a  
 Lawrence Co.: White (I C), 79  
 Luzerne Co.: Darton, 13a  
 Lycoming Co.: Meyer (A), 82  
 Mercer Co.: White (I C), 80  
 Monroe Co.: Kummel, 96  
 moraine, terminal: Lewis (H C), 83e, 84  
 northeastern: Branner, 86b; Rogers (H D), 42a  
 Philadelphia: Hall (C E), 76a; Lesley, 76c  
 Pocono Mountain Plateau: Lesley, 82  
 South Mountain: Frazer, 76f; Williams (E H), 93  
 southern limit of ancient glaciers: Wright (G F), 82a  
 southwestern: Stevenson, 78b, 80  
 Susquehanna Co.: Wilson (J H), 14  
 Susquehanna River region: Bashore, 89, 96; White (I C), 83  
 terminal moraine: Lewis (H C), 83e, 84; Wahn-schaffe, 92  
 Tioga quadrangle: Fuller, 03a  
 Warren region: Wright (G F), 14a  
 western: Chamberlin (T C), 94e; Foshay 90; Hice, 95; Wright (G F), 94c  
 Wyoming and Lackawanna valleys: Branner, 86  
 Wyoming Valley: Darton, 14  
 Peorian soil: Leverett, 98c  
 Plants, distribution: Transeau, 03  
 Pleistocene and present ice sheets: Upham, 93  
 Pleistocene deposits, genetic classification: Chamberlin (T C), 93e, 94g; 95a; McGee, 93c  
 Pleistocene ice sheet, fields of outflow: Upham, 13  
 Pleistocene mollusks, significance: Shimek, 13  
 Pleistocene physical geography: Salisbury, 09  
 Pleistocene succession: Upham, 94c  
 Nelson River basin: Upham, 94c  
 Wisconsin: Weidman, 13  
 Polished rocks: Adams (C B), 47d  
 Preglacial elevation: Upham, 90a  
 Prince Edward Island: Chalmers, 95; Dawson (J W), 71  
 Quaternary changes of level: Geer, 92a; Jukes-Browne, 91; Upham, 90f, 91i, j  
 Quebec: Buchan, 05; Chalmers, 96; Ramsay, 59; Willcox, 85  
 Anticosti Island: Grant (C E), 86; Laflamme, 02  
 Chibougamau region: Barlow 11c; eastern: Chalmers, 05; Ells, 88  
 Gaspé Peninsula: Bell (R), 63  
 Grenville region: Logan, 59  
 Labrador Peninsula: Low, 96a, 98  
 Lake St. John district: Dresser, 16  
 Magdalen Islands: Goldthwait, 14e, 15  
 Montreal: Dawson (J W), 57a; Stansfield, 15  
 Mount Orford: Chalmers, 05a; Dresser, 00  
 Murray Bay: Dawson (J W), 61b  
 northern: Low, 93a  
 Ottawa Valley: Ells, 98c; Johnston (W A), 16b, 17

## Glacial geology—Continued.

- Quebec: Pontiac and Ottawa cos.: Keele, 17  
 Portneuf, Quebec, and Montmorency cos.: Low, 92a  
 Rimouski: Honeyman, 85  
 Rivière-du-Loup: Dawson (J W), 65,  
 St. Lawrence Valley: Chalmers, 98a, 08  
 southeastern: Chalmers, 87, 87a, 98; Dresser, 10  
 southern: Chalmers, 04b; Goldthwait, 11  
 Three Rivers sheet: Ells, 00  
 Timiskaming Co.: Wilson (M E), 18  
 Recession of ice sheet, stages: Upham, 95g  
 Rhode Island: Jackson, 40; Shaler, 72, 96  
 Block Island: Hollick, 96c; Merrill (F J H), 96a  
 Narragansett Bay region: Fuller, 98a; Shaler 99; Woodworth, 96  
 Rock-scorings: Chamberlin (T C), 88  
 Rocky Mountains: Bliss (R), 72; Brown (R), 70a; Comstock, 86, 87e  
 St. Croix Dalles region: Chamberlin (R T), 05  
 St. Croix River: Upham, 96q  
 Sand-plain formation, season and time elements: Fuller, 99  
 Sangamon zone: Leverett, 98  
 Saskatchewan: McInnes, 13a  
 Lake Athabasca region: Tyrrell, 93a  
 southeastern: Stansfield, 18  
 southern: Davis (N B), 18  
 Sierra Nevada, glaciation: Johnston (W D), 96  
 South Dakota: Shimek, 12b; Todd, 85, 96, 99b, 10  
 Aberdeen-Redfield district: Todd, 09  
 Alexandria quadrangle: Todd, 03c  
 De Smet quadrangle: Todd, 04a  
 glacial boundary: Wright (C F), 89c  
 Huron quadrangle: Todd, 04  
 James River valley: Todd, 04b  
 Lincoln Co.: Bendrat, 04  
 Minnehaha Co.: Upham, 85  
 Mitchell quadrangle: Todd, 03b  
 Olivet quadrangle: Todd, 03  
 Parker quadrangle: Todd, 03a  
 Sioux Falls region: Carman, 13a; Shimek, 12a  
 southeastern: Todd, 99, 00, 12  
 Wisconsin drift-plain: Carman, 13  
 Southern States: Hilgard, 66b  
 Southernmost glaciation in United States: Johnson (D W), 10a  
 Striae, directions: Chamberlin (T C), 88  
 Submergence during glacial period: Dana (J D), 75b; upper Mississippi region: Squier, 84a  
 Superglacial drift, Wisconsin: Salisbury, 94f  
 Susquehanna Valley, extra-moraine drift: Wright (G F), 92b  
 Temperature in relation to glaciation: Becker, 83  
 Terminal moraine: Wright (G F), 82; west of Ohio: Chamberlin (T C), 83c  
 Terraces, Ohio River: Wright (G F), 96d  
 Thickness and extent of ice sheet: Upham, 99f; New England: Wooster, 83  
 Till, character in southern Illinois: Shaw (E W), 18f  
 Time divisions of Ice age: Upham, 01b  
 Two epochs, glacial and Champlain: Upham, 95j



## Glacial geology—Continued.

- Unity of Pleistocene glacial period: Wright (G F), 18a
- Utah, Uinta and Wasatch Mountains: Atwood, 07, 09
- Vegetable remains in drift: Winchell (N H), 76b
- Vermont: Adams (C B), 46; Hitchcock (C H), 06; Hitchcock (E), 61; Richardson (C H), 06; Stevenson, 06a; Upham, 89d
- Burlington region: Hitchcock (C H), 06a
- Calais, East Montpelier, and Berlin: Richardson (C H), 16
- Champlain basin: Hitchcock (C H), 10; Peet, 04
- Green Mountains: Goldthwait, 16a; Hitchcock (C H), 60a, 04; Hungerford, 68; Perkins (G H), 12
- Greensboro, Hardwick, and Woodbury: Jones (D J), 16
- Hanover quadrangle: Hitchcock (C H), 08
- Hardwick: Richardson (C H), 14a
- northwestern: Merwin, 08
- Wilmington area: Hubbard (G D), 18
- Woodbury: Richardson (C H), 14a
- Virginia: Stevens (R P), 73a
- Washington, Cascade Range: Russell, 00; Smith (G O), 04b
- Columbia River mouth: Smith (W H), 93
- Colville Indian Reservation: Pardee, 18a
- Cordilleran ice sheet: Stewart (C A), 13b
- Okanogan Co.: Dawson (W L), 98
- Puget Sound region: Bretz, 11, 13; Willis, 97a, b, 98a, b
- Republic district: Umpleby, 10
- Skykomish Basin: Smith (W D), 17
- Tacoma quadrangle: Willis, 99
- western: Bretz, 15; Leighton (M M), 18
- Weathering and erosion as time measures: Leverett, 09
- Western United States: Leverett, 17c; Whitney, 66f
- White, Adirondack, and Catskill Mountains: Johnson (D W), 17
- Winnipeg basin: Tyrrell, 91c
- Wisconsin: Alden, 11; Berkey, 07a; Bliss (J S), 66; Chamberlin (T C), 83; Martin (L), 16; Salisbury, 00; Weidman, 15
- central: Irving, 77
- Chippewa land district: Owen (D D), 48
- Devil's Lake and Baraboo: Salisbury, 97a
- deposits on bluffs of Mississippi: Squire, 08
- Driftless Area: Dana (J D), 78; Irving, 78a
- eastern: Alden, 04; Chamberlin (T C), 77a; abandoned shore lines: Goldthwait, 07
- Flambeau Valley: King (F H), 82
- Fox River forest beds: Lawson (P V), 02
- glacial Lake Nicolet: Upham, 03c
- Green Bay region: Winchell (N H), 71
- Green Lake Co.: Alden, 12a
- Kettle moraine: Chamberlin (T C), 78b, 80a
- Lake Superior district: Irving, 80a
- Milwaukee quadrangle: Alden, 06
- Mississippi region: Strong, 82
- north central: Weidman, 07a
- northwestern: Hotchkiss, 15
- Pleistocene succession: Weidman, 13
- Rock River: Swezey, 93

## Glacial geology—Continued.

- Wisconsin: St. Croix Dalles: Berkey, 97; Chamberlin (R T), 05
- St. Croix region: Chamberlin (R T), 10a; Strong, 80; Upham, 50; Wooster, 82
- southeastern: Alden, 05, 09a, 18
- terminal moraine: Wahnschaffe, 92
- Wisconsin Valley: Clark (A C), 82
- Wisconsin and Kansan drift sheets, central Iowa: Bain, 97a
- Wisconsin glaciation: Alden, 04
- Wyoming, Big Horn Mountains: Darton, 06e; Matthes, 00; Salisbury, 03, 06b
- Cloud Peak and Fort McKinney quadrangles: Darton, 06d; Salisbury, 06a
- Cody region: Sinclair, 12a
- western: Blackwelder, 15
- Yarmouth interglacial epoch, duration: Kay (G F), 16e
- Yarmouth weathered zone: Leverett, 98a
- Yukon: Hayes, 92a; Keele, 10; McConnell, 90a; Tyrrell, 99a
- Lewes and Nordenskiöld rivers district: Cairnes, 10a
- Glacial hypothesis in America: Merrill (G P), 06a
- Glacial lakes. *See also* Beaches; Shore lines; Terraces.
- Alberta: Coleman, 10c
- Algonquin beach, deformation: Spencer (J W), 91c
- Canada: Bell (R) 90a; Upham, 91, 95
- Channels over divides: Spencer (J W), 92a
- Erie basin: Leverett, 02
- Evanston-Waukegan region: Atwood, 08a
- General: Seott (W B), 97c; Spencer (J W), 07, Upham, 95g, 96j; Wright (W B), 14
- Great Lakes, history: Leverett, 10a
- Great Lakes region: Leverett, 02, 12c, 13a, 15; Spencer (J W), 95c; Taylor (F B), 95d, 13, 13a; Upham, 95, 96m
- Green Lake: Shaw (E W), 11c
- Hudson-Champlain and St. Lawrence: Upham, 03e
- Illinois, Chicago district: Alden, 02
- Indiana: Leverett, 15
- morainic lakes: Dryer, 97
- northwestern: Barrett, 17
- Kansas, Shawnee, and Wabaunsee cos.: Smyth (B B), 98a
- Lake Adirondack: Taylor (F B), 97c
- Lake Agassiz: Grant (U S), 06d; Hall (C M), 04; Johnston, 14a, 17b; Leverett, 12c, 13b, e; Tyrrell, 91c; Upham, 82, 84b, 87, 90, 91a, 96, 96e, 09, 10, 15; Willard, 04, 09
- genesis: Johnston (W A), 16c; Tyrrell, 96b
- history: Hall (C M), 04
- lineage: Todd, 90a
- Lake Albany, N. Y.: Chadwick, 10a
- Lake Algonquin: Goldthwait, 10a; Johnston (W A), 16a; Leverett, 14c; Taylor (F B), 95a, 10d; Simcoe Co., Ont.: Hunter, 03
- Lake Aplaus: Clarke (J M), 12
- Lake Arikaree, Iowa-S. Dak.: Todd, 92b, 03e
- Lake Bascom: Taylor (F B), 10c, 16
- Lake Bloomfield, N. Y.: Dryer, 08a
- Lake Bourvé, Mass.: Grabau, 00
- Lake Cairo, N. Y.: Chadwick, 10, 10a



## Glacial lakes—Continued.

- Lake Chicago: Alden, 04; Baker (F C), 12; Leverett, 97b  
 Lake Connecticut, Holoyoke, Mass.: Emerson (B K), 87  
 Lake Cuyahoga: Claypole, 88f  
 Lake Durham, N. Y.: Chadwick, 10a  
 Lake Hamlin, Minn.: Upham, 97d  
 Lake Housatonic: Taylor (F B), 10c  
 Lake Iroquois: Coleman, 99f, 04b, 13d, e; Davis (W M), 90d, 91c; Goldthwait, 10a; Spencer (J W), 88e, 90b, c, d, 92; Stone (G H), 91a; Taylor (F B), 92, 10d  
 Lake Kiskatom, N. Y.: Chadwick, 10a  
 Lake Maumee: Carney, 09b, 11c; Taylor (F B), 11a  
 Lake Memphremagog, Vt.: Hitchcock (C H), 07, 10  
 Lake Michigan basin, water planes: Goldthwait, 08  
 Lake Missoula, Mont.: Pardee, 10a; Stone (R W), 14c  
 Lake Muddy: Shaw (E W), 11c  
 Lake Nashua: Crosby, 99a  
 Lake Newberry: Fairchild, 95e  
 Lake Nicolet, Wis.: Upham, 03c  
 Lake Ohio: James (J F), 91b  
 Lake Ojibway, Ont.: Coleman, 09b, 10e  
 Lake Passaic, N. J.: Kümmel, 94; Salisbury, 95b  
 Lake Ronkonkoma, N. Y.: Bryson, 94  
 Lake Russell, Wash.: Bretz, 10  
 Lake St. Lawrence: Chalmers, 95b  
 Lake Sergeant, N. Dak.: Willard, 09  
 Lake Shawmut, Mass.: Crosby, 03, 03b  
 Lake Sudbury: Goldthwait, 05  
 Lake Superior region: Leverett, 10b, 17b; Martin (L), 11a  
 Lake Warren: Carney, 09b; Lawson, 93b, g  
 Lake Warrensburg, N. Y.: Miller (W J), 11  
 Lake Whittlesey: Carney, 09b  
 Lundy beach: Spencer (J W), 94d  
 Manitoba: Tyrrell, 90a; western: Tyrrell, 88  
 Massachusetts, Boston Basin: Crosby, 96; Grabau, 96  
 Charles River area: Clapp (F G), 01  
 Hampshire Co.: Emerson (B J), 98  
 Nashua Valley: Crosby, 99c, 03c  
 Maumee, Whittlesey, and Warren: Taylor (F B), 99  
 Michigan: Hobbs, 11c; Lane, 08a; Leverett, 15, 17  
 Alcona Co.: Leverett, 02a  
 Ann Arbor quadrangle: Russell (I C), 08  
 Detroit district: Sherzer, 17  
 Northern Peninsula: Leverett, 11  
 Saginaw Co.: Cooper (W F), 08  
 southeastern: Taylor (F B), 97a  
 Wayne Co.: Sherzer, 13  
 Minnesota: Leverett, 15a; Winchell (N H), 01a; northeastern: Upham, 94  
 Mississippi basin: Shaw (E W), 11c  
 Nevada: Gilbert, 74c  
 New Hampshire, White Mountains: Goldthwait, 16  
 New Jersey: Salisbury, 93

## Glacial lakes—Continued.

- New York: Fairchild, 09, 09c, 12a, 13, 16a  
 Adirondacks: Alling, 16  
 Black and Mohawk valleys: Fairchild, 12  
 Catskill Valley: Chadwick, 10a  
 central: Fairchild, 99b  
 Erie Co.: Houghton, 14  
 Finger Lake region: Fairchild, 99a; Watson, 99  
 Genesee region: Fairchild, 96c, 08  
 glacial waters, Oneida to Little Falls: Fairchild, 04b  
 Hudson-Champlain Valley: Upham, 05c; Woodworth, 05a  
 Irondequoit Valley: Chadwick, 17  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Niagara quadrangle: Kindle, 13c  
 North Creek quadrangle: Miller (W J), 14a  
 ponded pre-Wisconsin waters: Carney, 08  
 Schenectady quadrangle: Stoller, 11  
 Thousand Islands region: Cushing, 10a  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 western: Fairchild, 95c, d, 97b, c, 00f, 02  
 North Dakota: Willard, 02  
 Minnewaukan and Wamduska: Simpson (H E), 12  
 Ohio: Carney, 09b; Claypole, 87  
 ancient finger lakes: Hubbard (G D), 08a  
 Ashtabula quadrangle: Carney, 16b  
 Bellevue quadrangle: Carney, 13  
 Craighton Lake: Hubbard (G D), 14, 14a; Leverett, 14b  
 Oberlin quadrangle: Carney, 10a, 16a  
 Ontario: Mather, 17a  
 Algonquin and Nipissing: Goldthwait, 10  
 southwestern: Chalmers, 03; Taylor (F B), 13c  
 Toronto region: Coleman, 13c, e; Wright (G F), 14  
 Pennsylvania: Williams (E H), 17  
 Raised beaches and their cause: Pearson, 08a  
 St. Lawrence basin: Upham, 96i  
 St. Lawrence Valley: Coleman, 05a  
 St. Louis and Nemadji lakes: Winchell (N H), 06a  
 Shore lines: Todd, 92b  
 Time relations in Great Lakes region: Leverett, 13a  
 Utah: Gilbert, 74c  
 Vermont: Fairchild, 16; Perkins (G H), 12; northwestern: Merwin, 08  
 Warren, Algonquin, Iroquois, and Hudson-Champlain: Upham, 92c  
 Washington, Puget Sound: Bretz, 10, 13  
 Water-planes, ancient: Robinson (H H), 08  
 Wisconsin, Fox River Valley-Green Bay: Weidman, 11  
 southeastern: Alden, 18  
 Glacial period. *See* Glacial epoch; Glacial geology.  
 Glacial periods: Coleman, 08a, b  
 Glacial rock sliding: Jones (C C), 07  
 Glacial striae.  
 Canada, maritime provinces: Goldthwait, 15  
 Connecticut, Norfolk: Cornish, 90  
 General: Whittlesey, 67  
 Indiana, Richmond: Plummer, 43



**Glacial striae—Continued.**

- Iowa: Keyes, 95a; Norton, 11  
 Lamoni: Fitzpatrick, 98  
 southeastern: Fultz, 95e, 96  
 Lake Superior region: Shepherd, 47a; Whittlesey, 54  
 Maine: Stone (G H), 85  
 Massachusetts, Boulder, Amherst: Hitchcock (E), 56a  
 Brookline: Cabot, 48; Desor, 48a  
 Roxbury: Jackson, 48a  
 Somerville: Upham, 93g  
 Missouri, central: Kirkpatrick, 91  
 Kansas City: Case, 94a  
 New Brunswick: Robb, 51  
 Chaleur Bay region: Chalmers, 81  
 Newfoundland: Kerr, 70  
 New Jersey, Englewood: Dwight, 66  
 New York: Hayes (G E), 38a  
 Erie Canal: Thomas (D), 30  
 New York City: Dekay, 29  
 St. Lawrence Co.: Willcox, 73  
 Sullivan Co.: Thompson (W A), 31, 33  
 western: Dewey, 43a  
 Ohio: Whittlesey, 84  
 Kelleys Island: Whittlesey, 79  
 Sandusky Bay: Granger, 23  
 Ontario, Laurentian Hills: Andrews (E), 83  
 Pennsylvania, Northampton Co.: Rau, 97  
 Striae as evidence of direction of glaciation:  
 Lewis (H C), 86b  
 Glacial succession: Chamberlain, 93g; Leverett, 15  
 Glacial theory of Agassiz: Maclaren, 42  
 Glacial time  
 Niagara gorge as a chronometer: Upham, 94k  
 Ontario basin: Coleman, 17  
 Glacier National Park: Alden, 12, 14a; Campbell (M R), 14b, c; Martin (L), 13c  
 Glacières or freezing caverns: Balch, 00  
**Glaciers.**  
 Advance and retreat: Reid (H F), 96b; Shaler, 81a, 90e; Canadian glaciers: Ogilvie, 04a  
 Alaska: Blackwelder, 07b; Blake (W P), 67a; Brooks (A H), 14b; Capps, 09a, 10; Dall, 84; Davidson (G), 04; Gilbert, 04; Klotz, 07a; Martin (L), 10, 11b, 12, 13a, i; Meehan, 84; Muir, 02; Reid (H F), 96; Russell, 90, 93; Tarr (R S), 07e, 10a, 12, 13; Topham, 89; Wright (G F), 87a; Wolff (W), 15  
 Alaska Peninsula: Grant (U S), 10d  
 Alaska Range: Capps, 12b  
 Allen Glacier: Martin (L), 13d  
 Childs Glacier, Copper River: Martin (L), 11c  
 Barry Glacier, retreat 1910-14: Johnson (B L), 16  
 Broad Pass region: Moffit, 15  
 Columbia Glacier, Prince William Sound: Martin (L), 11c  
 Glacier Bay: Martin (L), 13; Morse, 08; Reid (H F), 96; Wright (C W), 07b; Wright (F E), 07d  
 Hubbard Glacier: Martin (L), 10a; front in 1792 and 1794; Tarr (R S), 07c  
 Kenai Peninsula: Grant (U S), 10d, 13  
 Kobuk Glacier: Hershey, 09  
 Malaspina Glacier region: Martin (L), 09a; Tarr (R S), 07b, d

**Glaciers—Continued.**

- Mount McKinley region: Brooks (A H), 11  
 Mount St. Elias region: Belcher, 62; Russell, 91c, 92a  
 Muir Glacier: Andrews (C L), 03; Baldwin, 92, 93; Chickering, 88; Cushing, 91, 93; Reid (H F), 92, 92a, 96; Russell, 92b; Wright (G F), 87, 92c  
 Nizina district: Moffit, 11a  
 Prince William Sound: Grant (U S), 10d; Martin (L), 13e  
 Skolai Mountains: Rohn, 00  
 southeastern: Klotz, 99; Martin (L), 15b  
 Wrangell Mountains: Capps, 10  
 Yakutat Bay region: Martin (L), 13; Tarr (R S), 06e, 07b, 08, 09, 10c, 12b  
 Alberta: Vaux (G), 06, 07, 07a, b  
 Selkirk and Rocky Mountains: Sherzer, 05  
 variations: Vaux (G), 04  
 Anticyclones above continental glaciers: Hobbs, 15b  
 Blue veins: Reid (H F), 01, 04  
 British Columbia: Ogilvie, 14; Palmer (H), 10; Vaux (G), 99, 06, 07, 07a, b  
 Bute Inlet: Whympers, 68  
 Lefroy Glacier: Sherzer, 07a  
 Mount Robson: Coleman, 10b  
 Robson Glacier: Wheeler (A O), 15a  
 Selkirk and Rocky Mountains: Sherzer, 05  
 Selkirk Range: Green (W S), 89; Illecillewaet Glacier: Penck; 98 Vaux (G), 00  
 Sir Sandford Glacier, 1911: Palmer (H), 12  
 variations: Vaux (G), 00a, 01, 04, 11, 13  
 Yoho Glacier, motion: Wheeler (A O), 07a, 08, 11, 13, 15, 17, 18  
 California: Muir, 72a  
 Mount Shasta: King (C), 71a  
 Mount Lyell: Lee (W T), 05a  
 Sierra Costa Mountains: Hershey, 00b  
 Sierra Nevada: Muir, 74b; Russell, 84a, 85b, 89; variations: Gilbert, 04b  
 Yosemite Valley: Kneeland, 72  
 Canada: Coleman, 17b  
 Rockies and Selkirks: Sherzer, 06, 07  
 variations: Vaux (G), 06, 07, 07a, b  
 Cause: Dutton, 84c; Meunier, 15  
 Cause of motion: Thompson (J L), 70  
 Classification of deposits: Woodworth, 99  
 Colorado: Henderson (J), 10b  
 Arapahoe Glacier: Fenneman, 02b; Henderson (J), 04a, 05a; Lee (W T), 00a  
 Hague's Peak: Stone (G H), 87a  
 Mills moraine, Longs Peak region: Orton (E jr), 09  
 Constructive work: Scott (W B), 97d  
 Continental glacier, effect of pressure of: Winchell (A), 88b  
 Continental glaciers, alimentation: Hobbs, 11f; motion: Shaler, 75c  
 Convection, influence on glaciation: Becker, 84  
 Cornices: Russell (I C), 03b  
 Crescentic fractures, formation: Lahee, 12  
 Débris on glaciers, source: Campbell (J T), 92  
 Definition: Russell (I C), 85d  
 Descent: Le Conte (John), 55  
 Distribution in America: Russell (I C), 92c  
 Drift deposits: Chamberlin (T C), 82b



## Glaciers—Continued.

- Erosive action: Carney, 07a; Niles, 78a; Scudder, 63d; Tarr (R S), 07e
- Experimental studies on ice structure: Von Engeln, 15
- Flow: Reid (H F), 96c; Upham, 96g; influence of débris: Russell, 95c
- Flow and stratification: Reid (H F), 05b
- Folding produced by glacial action: Sardeson, 06
- Formation: Agassiz (L), 63i; Vose, 68c
- General: Agassiz (L) 64; Chamberlin (T C), 04; Dana (J D), 86h; Dawson (J W), 93c; Hobbs, 10b 11; Kendall, 95; Marcou, 86a; Reid (H F), 03, 07b, 09; Salisbury, 02a; Shaler, 81; Vaux (W S), 07; Winchell (R), 90d
- Greenland: Chamberlin (T C), 95; Drygalski, 97; Heilprin, 94; Helland, 79; Koch (J P), 12, 15; Nordenskjöld, 09; Salisbury, 95d, 96a; Tarr (R S), 97m
- Cornell Glacier: Tarr (R S), 97d, i
- Nugsuak Peninsula: Tarr (R S), 97g
- rapidity of movement in winter: Helland, 81
- Umanak district: Barton, 97
- variations, 1912: Mercanton, 13
- Ice sheets, present: Upham, 93
- Inland-ice of Arctic regions: Hobbs, 10a
- Internal structure: Agassiz (L), 63j
- Glacial luncid furrows, origin: Packard (A S), 90
- Mechanics: Reid (H F), 96a
- Melting: Reid (H F), 07a
- Montana: Chaney, 95, 96
- Crazy Mountains: Mansfield, 09
- Glacier National Park: Alden, 14a; Campbell, (M R), 14b
- northwestern: Grinnell, 98
- Rocky Mountains: Chaney, 05
- Moraines: Reid (H F), 97
- Movement: Agassiz (L), 63j; Chamberlin (T C), 80a, 04, 07f; Claypole, 75; De Laski, 69; Le Conte, 88a; McGee, 81d; Main, 90; Müggc, 99, 00; Reid (H F), 00, 01; Rogers (W L), 88; Russell, 97c; Shaler, 90e; Spencer (J W), 88a, f; Tarr (R S), 10c; Wilcox, 06; cause: Watts (O P), 95; experimental studies: Tarr (R S), 15
- Moulin work under glaciers: Gilbert, 06a
- Névé line: Reid (H F), 07
- North America: Russell, 97 98e
- Oregon, central: Russell, 05
- Mount Hood: King (C), 71a; Reid (H F), 02, 05c, 06; Sylvester, 08
- Mount Jefferson: Hatch, 17a
- Three Sisters: Williams (I A), 16c
- Pacific slope: Coleman (E T), 77; Zittel, 90
- Plasticity of ice: Russell (I C), 97c
- Properties of ice: Tarr (R S), 12d
- Reservoir lag in glacier variations: Reid (H F), 05
- Review, 1903-1907: Rabot, 09
- Ribbon structure of ice: Desor, 49a; Rogers (H D), 50d
- Rocky Mountains: Coleman, 15b; Emmons (S F), 88b
- Sierra Nevada: King (C), 71a

## Glaciers—Continued.

- Stratification: Reid (H F), 97a, 99a, 00a, 01, 04
- Superglacial drift: Salisbury, 94b
- Tidal glacier, statics: Gilbert, 03f
- United States, western: Grad, 71; King (C), 71b; Russell (I C), 85a
- Variations: Reid (H F), 95, 96, 04; Wright (G F), 09
- Washington, Cascade Mountains: Russell, 00
- Chelan: Gannett, 05
- Mount Adams: Lyman, 96; Reid (H F), 02, 05c, 06
- Mount Baker: Landes, 07
- Mount Rainier: King (C), 71a; Matthes, 12a, 13a, 14, 14b; Roberts, 09; Russell (I C), 98a; Williams (J H), 10; Nisqually Glacier: Le Conte (J N), 06
- Work of glaciers: Scott (A C), 02; in high mountains: Johnson (W D), 99a
- Wyoming: Hayden, 78e; Wind River Mountains: Blackburn, 81; Hayden, 78g
- Yukon: Hayes, 92a
- Glass Mountains, Texas: Udden, 17
- Glass sand.
- General: Burchard, 06, 07j; Fettke, 17, 18a
- Indiana: Barrett, 14a; Burchard, 07i
- Kentucky: Burchard, 07i
- Mississippi Valley: Burchard, 06a
- New Jersey: Kummel, 07a
- Ohio: Burchard, 07i; Carney, 10b; Toboso deposits: Carney, 08c
- Oklahoma: Buttram, 13; Gould, 08d, 10c; Arbuckle Mountains: Reeds, 10
- Pennsylvania: Fettke, 18a
- United States: U S G S, 83
- Virginia: Watson, 07e
- West Virginia: Grimsley, 09; Stose, 06a
- Jefferson, Berkeley, and Morgan cos.: Grimsley, 16
- Pawpaw and Hancock quadrangles; Stose, 12b
- Glaueonite.
- General: Bagg, 09a; Clarke (F W), 03a; Goldman, 16; Prather, 05a
- Genesis: Palmer (C), 14b
- Geologic occurrence: Hunt, 74c
- In dolomite and limestone of Missouri: Tarr (W A), 18e
- In Lower Silurian rocks: Hunt, 62d
- Missouri, southeastern: Ross, 16, 17
- New Jersey: Clark (W B), 93a
- South Carolina: Sloan, 08
- Glendive lignite field, Dawson Co., Mont.: Hance, 12
- Gleneyrie formation: Finlay, 07a
- Glenrock coal field, Wyo.: Shaw (E W), 09
- Globe district, Ariz.: Tolman, 09d; Tovote, 14
- Globe folio, Ariz. (no. 111): Ransome, 04a
- Globidens alabamaensis: Gilmore, 12
- Glomerates: Field, 16
- Glossary of geologic terms: Cornett, 84; Lee (S E), 86
- Glyptodendron, Clinton rocks: Claypole, 78
- Glyptodont from Mexico: Brown (B), 12, 12c
- Glyptotherium, Pleistocene, Texas: Osborn, 03b



## Gneiss.

Georgia: McCallie, 10

New York: Newland, 16

Origin: Bell (R), 90b; Meunier, 15a

Gold. *See also names of gold-producing States.*

Associated minerals: Nicholson, 13

Associates of gold: Lincoln, 11; Merrill (G P), 05b

Association with other metals: Pearce, 90b; with pyrite and tellurides: Sharwood, 07

Alluvial gold: Garrison, 09a

Appalachians, southern: Read, 06b

Atlantic States: Partz, 54

Aurite: Voyle, 03

Bonanzas, formation: Rickard, 01b

Canada: Logan, 64

Central States, exploration in: Hall (C W), 98

Classification of deposits: Lindsley, 14

Colloidal gold: Bastin, 15

Concentration: Tyrrell, 11

Deposition by drainage: Bradford, 04

Deposition in nature: Lenher, 14, 18

Distribution: Newberry, 81; Purington, 03c

geographic: Lindgren, 03d; Marcou, 67c

geologic: Lieber, 59c; Lindgren, 03d; Rickard (T A), 06b

Enrichment: Brokaw, 13; Emmons (W H), 17; Rickard, 98; Weed, 01c

Fineness of gold: Knopf, 13c; Smith (P S), 13

Free gold in granite: Merrill (G P), 96c

General: Becker (G F), 75a, 95; Blake (W P), 69; Chance, 00a; Emmons (S F), 93b; Lindgren, 03d, e, 16; Purington, 03c

Genesis: Newberry, 81; Voyle, 03

Geologic age: De Quille, 96

Geologic features of gold production: Lindgren, 03d

Geologic horizon: Jackson, 62a

Geologic occurrence: Blake (W P), 92a

Glacial, in Wisconsin: Thomas (K), 02a

Gold-bearing fissure veins: Lindgren, 97c

Gold-bearing pudding stones: Becker, 97

Lake Superior region: Whittlesey, 74b

Lixiviation by vegetation: Lungwitz, 00

Lodes, age: Richthofen, 69

Manganese, agency in alteration: Eddingfield, 13; Keyes, 11e

Manganese in enrichment of gold deposits: Emmons (W H), 10b; Keyes, 11e

Metallic precipitants: Palmer (C), 13a

Minerals accompanying: Rickard, 98

North America: Lindgren, 16

Nuggets, formation: Egleston, 81; Hurley, 00

Occurrence: Eaton (A), 31a; Genth, 59; Hausmann, 91; Storms, 00a; Waddington, 54; and distribution: Maclaren, 08

at intersections: Storms, 11b

in galena and iron pyrites: Dewar, 91

in granite and plutonic rocks: Blake (W P), 97a

in Rocky Mountains and California: Marcou, 61b

mode of: Nichols (W), 95; of gold-bearing quartz: Rickard, 95

Ores, classification: Fulton (C H), 16

Origin in Canadian pre-Cambrian deposits: Wallace (R C), 18; in quartz veins: Lobley, 94

## Gold—Continued.

Original native gold in igneous rocks: Brock, 04b; Mallery, 04; Weed, 04e

Paragenesis of gold-bearing ores: Pearce, 90a

Persistence of ore in depth: Maclaren, 13

Placer deposits: Collins (W F), 09; Hutchins, 07a, b; Kirby, 02

genesis: Dunn, 94a; Egleston, 81; Wood (H R), 92a

Glaciated regions: Stone (G H), 00a

origin and classification: Smyth (H L), 05

United States: Janin, 18

Production: Lindgren, 05b, 08; Newberry, 88c

Production, derivation, and future: Lindgren, 02b

Prospecting: Lakes, 95

Pyritic ores: Emmons (W H), 11b

Quartz, gold-bearing: Courtis, 90

Secondary enrichment in gold veins: Mann, 11; Reed (H W), 11

Selenium with pyrite: Pearce, 93g

Solution of gold in surface alterations of ore bodies: Brokaw, 10

Sources: Calvert, 54

Southern Appalachians: Bakewell, 32; Becker (G F), 95; Dickson, 34; Dignowity, 04; Dodge (W R), 15; Lieber, 60a; Nitze, 96b, 97

Telluride ores: Kemp, 98b

Tellurium associated with gold: Pearce, 98b

Tellurium-bearing ores: Sharwood, 11

Transportation and deposition in nature: Lenher, 12

United States (general): Browne (J R), 67; Lindgren, 09b; Patterson, 50; Read, 06b; U S G S, 83

Eastern States: Dunlop, 15

east of Rocky Mountains: Taylor (J W), 67

west of Rocky Mountains: Browne (J R), 68

Gold Brick district, Colo.: Crawford, 16

Golden area, Colo.: Schneider (H), 13

Goldfield district, Nev.: Hastings, 06b; Ransome, 07, 07a, 09, 10a

Gold Hill copper district, N. C.: Laney, 08, 10

Gold Hill district, Alaska: Maddren, 09a

Goniolina in Comanche series: Hill (R T), 90a

Goniometer, crystal-grinding: Wright (F E), 15a

Goose Creek district, Idaho: Bowen (C F), 13a

Gorges and waterfalls: Davis (W M), 84

Gorgosaurus: Lambe 14e

Government geologic surveys: Smith (G O), 18a

Gowganda Lake region, Ont.: Burrows (A G), 09; Collins (W H), 13; Iseman, 10

Graham Island, B. C.: Ells, 06, 06b; MacKenzie, 14a

Grahamite: Richardson (C), 10

Colorado: Newberry, 87

Oklahoma: Taff, 09a

Origin: Richardson (C), 16a; White (I C), 99a

Grain of rocks: Lane, 97b, 08b

Granby area, Mo.: Buckley, 06, 07

Grand Canyon of Colorado. *See Arizona.*

Grand Central quadrangle, Alaska: Moffit, 13

Grand Encampment copper district, Wyo.: Beeler, 05a

Grand Gulch region, Mohave Co., Ariz.: Hill (J M), 14b



Grand Gulf formation: Dall, 92a, 02b, 03; Foerste, 93a; Hilgard, 03; Johnson (L C), 89, 92a  
Meyer (O), 86a; Smith (E A), 02a

Grand Hogback coal field: Gale, 07a

Grand Mesa coal field, Colo.: Lee (W T), 09

Grand Tower formation, Ill.: Savage, 10d

Grand Wash Cliffs, Ariz.: Schrader, 08a, 09

Granite. *See also* Building stone.

Atlantic coast: Kemp, 99c

California, Sierra Costa Mountains: Hershey, 00c

Disaggregation: Tarr (W A), 15

Distribution: Watson, 02

General: Hitchcock (E), 61; Surr, 09c; Watson, 10

Heating tests: Tarr (W A), 15

Hydrothermal alteration: Moore (E S), 14c

Maryland: Keyes, 95i; Williams (G H), 95

Missouri: Keyes, 95o

New England: Dale, 07a; Winchell (N H), 84d

New York: Newland, 16

Northwestern States: Hall (C W), 89c

Origin: Hunt, 69c; Lane, 13a; Winchell (N H), 03e; in sills: Schofield, 12b

Rifting and grain: Whittle, 00

Southeastern Atlantic States: Watson, 10

Southern States: Burchard, 12

Structural features: Dale, 09

United States, southeastern: Watson, 10

Granitization, regional: Sederholm, 13a

Grants Pass quadrangle, Oreg.: Diller, 09a

Grantsville quadrangle, Md. (folio 160): Martin (G C), 08a

Graphic methods for solution of geologic problems: Smith (W S T), 14

Graphical plot for plagioclase feldspars: Wright (F E), 13e

Graphite.

British Columbia, Cranbrook: De Schmid, 17

California: Boalich, 18a

Canada: Ells, 04a; Hoffmann, 78; Spence (H S), 18

General: Bateman (G C), 05; Ferguson (H G), 17a; Hess, 08g; Julien, 83b; Miller (B L), 12e; Pratt, 01j; Smith (G O), 06d; Walker (J A), 83

Mexico: Vivar, 16

New York, Adirondack mountains: Alling, 17; Bastin, 10a

Origin: Alling, 17; Newberry, 87; Stansfield, 13a; Winchell (A N), 11a

Pennsylvania: Miller (B L), 12e

Quebec, Amherst: Cirkel, 11a; Buckingham; area: Wilson (M E), 17b

United States: Bastin, 12a; Ihne, 09; Pratt, 05b  
U S G S, 83

Graptolitoidea.

Arkansas: Gurley (R R), 92a

British Columbia, Dease River: Lapworth, 88; Kicking Horse Pass: Lapworth, 87a

Cambrian: Matthew (G F), 95i

Canada: Ami, 96d; Billings, 61b; Hall, 58b; Quebec group: Hall, 65

Dictyonema fauna, New Brunswick: Hahn, 12a

Dictyonema websteri: Ruedemann, 08a

Didymograpsus, Quebec: Bigsby, 53

Diplograptus: Ruedemann, 95, 97

Graptolitoidea—Continued.

Distribution: Ruedemann, 11

General: Hall, 50c, 67b; Ruedemann, 98c, 08

Goniograptus, Levis formation, Quebec: Ami, 89a, b

Goniograptus thureau: Ruedemann, 02a

Graptolithus: Hall, 59f, 60

Literature: Gurley (R R), 91

Maine, Penobscot Co.: Dodge (W W), 90

Minnesota, Ordovician: Winchell (N H), 95b

New York: Ruedemann, 04

Poughkeepsie: Booth, 83

Rensselaer Co.: Ruedemann, 02

Schodack Landing: Ford (S W), 84a

North America: Gurley (R R), 96

Ontario, Hamilton: Bassler, 09a; Grant (C C), 96a, 03; Spencer (J W), 78, 83a, 84

Protistograptus, St. John, N. B.: McLearn, 15b

Quebec: Lapworth, 87

Levis: Raymond (P E), 14d, e

Point Lévy: Hall, 58c

Quebec group: Dawson (J W), 83d; Hall, 65a

Vermont, Calais, East Montpelier, and Berlin: Richardson (C H), 16

Orange Co.: Richardson (C H), 02

Virginia, Athens shale: Powell (S L), 15

Wisconsin, St. Croix River: Prout, 51a

Zoological affinities: McCrady, 59

Graptolite shales, shallow-water deposits: Grabau, 17a

Grass Valley district, Cal.: Silliman (jr), 67

Gratacap, L. P., biography: Kunz, 18a; Stanton (G S), 18

Gravel.

Arkansas, Caddo Gap and De Queen quadrangles: Miser, 18

Formation and distribution: Gregory (H E), 15a

General: Stone (R W), 16a

Georgia: McCallie, 10

Illinois: Udden (Jon A), 10b; Chicago district: Burchard, 08a

Kansas, Burlington: Parker (J D), 81

Maryland: Clark (W B), 09

Nebraska: Condra, 08a

Oklahoma: Gould, 08d, 10c

Oregon: Parks (H M), 12a; Portland: Darton, 09b

Pennsylvania, anthracite region: Darton, 13; Pittsburgh district: Shaw (E W), 10

Tennessee, western: Wade, 17b

United States: U S G S, 83

Virginia, Coastal Plain: Watson (T L), 12a

Washington, Seattle-Takoma region: Darton, 09b

Gravel as a resistant rock: Rich, 11

Gravimetric survey: Bowie, 17a

Gravina Island, Alaska: Smith (P S), 15

Gravity anomalies, interpretation: Gilbert, 13; in locating salt domes: Shaw (E W), 17e

Grayback district, Colo.: Patton, 10a

Graydon sandstone, southwestern Mo.: Babcock, 04

Great Basin: Blake (J), 73a; Brewer (W H), 89; Gilbert, 82, 90; Russell, 88; physiography: Free, 14

Great Basin lakes: Gale, 14; origin: Keyes, 18b

Great Basin mountain ranges: Davis (W M), 03a; Keyes, 09b; deformation: Baker (C L), 13b



Great Basin region, potash and salines: Young (G J), 14

Great Divide Basin coal field, Wyo.: Smith (E E), 09

Great Falls coal field, Mont.: Fisher (C A), 07, 09; Shurick, 09; flora: Newberry, 91

Great Falls region, Mont.: Fisher (C A), 09a

Great Lakes.

Age, bibliography: Winchell (A N), 97

Basins: Drummond, 89; origin: Newberry, 78; Spencer (J W), 90e

Changes of level: Gilbert, 88a

Drainage into Mississippi River: Spencer, 94f

Former outlet: Claypole, 86b

General: Spencer (J W), 98a, 13a, e; Newberry, 62a

History: Herbertson, 96; Leverett, 10a, 15; Newberry, 89e; Spencer (J W), 88g, 94c, 95; Taylor (F B), 97, 07

Origin: Bell (R), 88a, 99a; Drummond, 89; Farnsworth, 92; Newberry, 69a, 74, 82e; Spencer (J W), 82a, b, 87, 88g, 96a; Anon, 92; and structure: Newberry, 74u

Lake Nipissing outlet: Wright (G F), 93

Postglacial outlet: Wright (G F), 93c

Source of waters: Shufeldt, 67

Great Lakes region: Clinton, 25; Spencer (J W), 95c

Great Plains, origin: Keyes, 11b; physiography: Hill (R T), 92a; subsidence basins: Johnson (W D), 99b

Great Raft, Louisiana: Veatch (A C), 99

Great Salt Lake: Talmage, 96, 01b; outlet: Gilbert, 76, 78a; Peale, 78a

Green, W. L., biography: Hitchcock (C H), 00

Green Mountain belt of rocks, structural features: Gordon (C E), 16

Green Mountain gneiss, New England: Hitchcock (C H), 84c

Green Mountains: Perkins (G H), 12; Whittle, 94a; age: Dana (J D), 80b; structure: Dale, 02

Green Pond Mountain group, N. J.: Merrill (F J H), 87b

Green River, origin: Emmons (S F), 97c; Hills, 91c

Greenalite: Clarke (F W), 03a

Greeneville folio, Tenn.-N. C. (no. 118): Keith, 05

Greenland.

Disko Island and Nugsuak Peninsula: Ravn, 11

Disko region, western Greenland: Steenstrup, 74

General: Brown (Robert), 83; Chancourtis, 57; Holst, 86; Jones (T R), 75; Nordenskjöld, 71, 72a; Salisbury, 95d; Anon, 30

Geology and physical geography of east Greenland: Nordenskjöld, 09

Julianehaab district: Steenstrup, 10; Ussing, 12

Northwestern Greenland: Heim, 11a

*Economic geology.*

Coal, Karsuarsuk district: Heim, 11

Cryolite, Ivigtut: Baldauf, 10; Bernard, 16; Canby, 97; Halland, 11; Ussing, 08

Graphite, Karsuarsuk district: Heim, 11

Iron: Lorenzen, 93; Steenstrup, 11

*Historical geology.*

Carboniferous, northeastern Greenland: Grönwall, 17

Cretaceous, western coast: Ravn, 18; White, (D), 98a

## Greenland—Continued.

*Historical geology—Continued.*

Disko region: Brown (R), 75

Eastern Greenland: Knutsen, 89; Lenz, 74; Toula, 74

Egedesminde district: Pjetursson, 98

General: Böggild, 17; Chamberlin (T C), 94; Chancourtois, 57; De Rance, 75; Holst, 86; Johnstrup, 78; Nordenskjöld, 71, 72a; Rink, 67; Robert, 41

Julianehaab district: Jessen, 96; Steenstrup, 81; Ussing, 11

Jurassic, eastern Greenland: Skeat, 04

Karsuarsuk district: Heim, 11

Miocene: Brown (R), 68

Northern Greenland: Steenstrup, 93, 93a

Northeastern Greenland: Nathorst, 01; Ravn, 11a

Parker Snow Bay: Hovey, 18a

Plant beds, Atanekrdluk: Whympers, 70

Post-Tertiary: Feilden, 77

Scoresby Sound region: Bay, 96

Southern Greenland: Laube, 73; Pingel, 43

Tertiary, Cape Dalton: Ravn, 03; northern Greenland: Heer, 70

Western Greenland: Heim, 11b; Kornerup, 79, 81; Ravn, 18

*Mineralogy.*

Albite: Dreyer, 10; Grosspietsch, 08

Arksutite, Ivigtut: Nordenskjöld, 86

Basalt minerals, eastern Greenland: Böggild, 05

Britholite: Böggild, 11

Carposiderite: Pisani, 64

Cryolite: Hagemann, 66a

Cryolite minerals: Böggild, 12, 12a; Hagemann, 66

Dahllite, Kangerdluarsuk: Böggild, 15a

Eudialite: Rørdam, 93

Fiskernaes: Ussing, 89

Gadolinite: Allan (T), 12

General: Böggild, 05a; Giesecke, 61; Johnstrup, 78; Lorenzen, 93a

Gyrolite: Böggild, 08

Ilvaite, Julianehaab: Böggild, 02

Iron: Steenstrup, 83; Disko: Steenstrup, 77; native, Ovifak: Daubree, 72a; near Ivigtut: Steenstrup, 11

Ivigtite: Hagemann, 69; Rand, 68

Julianehaab district: Böggild, 01, 03; Lorenzen, 81

Kaersutite: Washington, 08

Kangerdluarsuk: Lorenzen, 93b

Leifite, Narsarsuk: Böggild, 15

Meteorite, Cape York: Hovey, 05h; Peary, 94, 98

Disko Island: Goldsmith, 93a

Ovifak: Daubree, 72; Nordenskjöld, 72

Savisavik: Shepard, 66b

Narsarsuk region: Böggild, 06; Flink, 01

Native iron in basalt: Smith (J L), 78b, 79

Nickeliferous iron, northern Greenland: Steenstrup, 83

Northern Greenland and Frobisher Bay: Emerson (B K), 05a

Pachnolite: Koenig, 76b

Ralstonite, Arksut Fiord: Brush, 71a; Penfield, 86c



## Greenland—Continued.

*Mineralogy*—Continued.

Siderite, Ivigtut: Wherry, 17b

Sodalite: Thomson, 12

Southern Greenland: Flink, 98

Stalactitic minerals, Ivigtut: Böggild, 12b

Steenstrupine: Moberg, 99

Ussingite: Böggild, 14

*Paleontology*.

Carboniferous Brachiopoda, northeastern Greenland: Grönwall, 17

Cretaceous, western Greenland: Ravn, 18

Disco region: Brown (R), 75

Insecta, Cape Dalton: Henriksen, 18

Invertebrata, northern Greenland: Lorient, 93

Jurassic fauna: Fraas, 04

Invertebrata, eastern Greenland: Madsen, 03

Mollusca, Cape Stewart: Lundgren, 96

Jurassic and Cretaceous fossils, northeastern Greenland: Ravn, 11, 11a

Kuhn Island, eastern Greenland: Toula, 74a

Plantae: Heer, 80, 83, 93; Scott, 72

Carboniferous: Heer, 74b; Nathorst, 11

Cretaceous: Heer, 68b, 71, 74

eastern Greenland: Heer, 74c

Jurassic, Cape Stewart: Hartz, 96

Miocene, northern Greenland: Heer, 66, 67, 69a, 70, 70a, 73, 74a

Pleistocene: Kindle, 97

Quaternary: Jensen, 17; Mollusca: Jensen, 09

*Petrology*.

Cryolite deposits, rocks from: Beck, 10

Eastern Greenland: Bauer, 74; Knutsen, 89; Nordenskjöld, 04

General: Giesecke, 10; Lorenzen, 93; Robert, 41; Törnebohm, 86

Iron, native, Oviak: Daubrée, 72a

Iron-bearing rocks, Disko Island: Nicolau, 01

Julianehaab region: Ussing, 11

Karsuarsuk district: Heim, 11

Nepheline syenite: Ussing, 98

Northern Greenland and Frobisher Bay: Emerson (B K), 05a

Northwestern Greenland: Belowsky, 05

Nugsuaks Peninsula: Phalen, 04

Olivine rock: Rörödam, 89

Southern Greenland: Vrba, 74

Western coast: Kornerup, 81

*Physical geology*.

General: Böggild, 17

Glaciers: Chamberlin (T C), 94, 95; Drygalski, 97; Heilprin, 94; Helland, 79; Koch (J P), 12; Salisbury, 95d, 96a; Tarr (R S), 97m

Cornell Glacier: Tarr (R S), 97i; former extension: Tarr (R S), 97d

Nugsuak Peninsula: Tarr (R S), 97g

rapidity of movement in winter: Helland, 81 variations, 1912: Mercanton, 13

Ice phenomena: Koch (J P), 15

Inland-ice: Hobbs, 10a; Mügge, 99, 00; Norden-skjöld, 83

Nivation and solifluction: Ekblaw, 18

Sea floor deposits, east coast: Böggild, 03a

Sinking of west coast: Pingel, 35, 41

*Physiographic geology*.

Egedesminde district: Pjetursson, 98

## Greenland—Continued.

*Physiographic geology*—Continued.

General: Böggild, 17

Glaciation: Barton (G H), 96; Chamberlin (T C), 95, 97d, e; Lindahl, 88; Salisbury, 96a; Sherwood, 90; Tarr (R S), 97; Williams (E H), 97; Wright (G F), 95

limit: Chamberlin (T C), 97

Umanak district: Barton, 97

Ice, western coast: Pingel, 47; continental: Drygalski, 97; Rink, 87

Ice cap, thickness: Schwarz (E H L), 06

Ice fields: Wright (G F), 96

Ice sheet: Upham, 91b

Nugsuak Peninsula: Watson, 99b

Southern Greenland: Laube, 73

Umanak district: Barton (G H), 97

West coast: Kornerup, 79, 81

## Greensand.

Analysis, methods: Hicks (W B), 17

New Jersey, origin and classification: Clark (W B), 94a

origin: Bailey (J W), 56a

United States, eastern: Ashley, 17a

Greenwater copper district, Cal.: Boyle, 07; Zalin-ski, 07

Grenada: Harrison (J B), 96; Sapper, 03b

Grenadines: Spencer (J W), 02

Grenville-Hastings series, Adams (F D), 97; Ells, 97c

Grenville-Hastings unconformity: Miller (W G), 09a

Greybull oil and gas field, Wyo.: Hintze, 15

Greylock synclinalorium: Dale, 91

Grindstone quadrangle, N. Y.: Cushing, 10a

Gros Ventre slide, Wyo.: Blackwelder, 12b

Groundhog anthracite field, B. C.: Evans (G W), 14

Groundhog coal basin, Skeena district, B. C.: Malloch, 12, 12a

Ground-ice wedges, Alaska: Leffingwell, 15

Guadalupian series: Keyes, 10i

Guadalupian fauna: Girty, 08

## Guadeloupe.

General: Lescallier, 08; Montserrat, 67; Moreau de Jonnés, 22; Sapper, 03i

*Historical geology*.

General: Duchassaing, 47, 55; Spencer (J W), 01a

*aleontology*.

Basse-Terre: Payen, 63

*Physical geology*.

Argon in gas of fumeroles: Moissan, 04

Earthquake, 1843: Sainte-Claire Deville, 60; 1845: Moreau de Jonnés, 46

Grande Soufrière: Hovey, 04a, d, f, 05f

*Physiographic geology*.

General: Spencer (J W), 01a

## Guano.

Caribbean Sea: Taylor (W J), 57

General: Edwards (A M), 69

Origin: Edwards (A M), 71

South Carolina, Charleston: Jackson, 68

Texas, bat caves: Phillips (W B), 01c

## Guatemala.

Alta Vera Paz: Sapper, 01a

General: Sapper, 04b



## Guatemala--Continued.

*Historical geology.*

- Alta Vera Paz: Sapper, 01a  
 Eastern Guatemala: Powers, 18  
 General: Burkart, 69b; Dollfus, 68; Sapper, 94b

*Petrology.*

- Cinders, volcano Santa Maria: Villasenor, 03  
 Eruptive rocks: Bergeat, 94  
 Volcanic ash, Santa Maria: Bergeat, 03, 03a;  
 Brauns, 03; Ordóñez, 02c  
 Volcanic dust: Diller, 02g

*Physical geology.*

- Craters, types: Sapper, 94a  
 Earthquakes, April 18, 1902: Sapper, 02  
 April 19, 1902: Omori, 07c  
 December, 1917-January, 1918: Anon, 18d  
 recent: Rockstroh, 03  
 1895-6: Sapper, 97  
 1902: Eisen, 03  
 Earthquakes and eruption of 1902: Ascoli, 09  
 General: Burkart, 69b; Dollfus, 68  
 Volcanoes: Anderson (T), 08a, 09; Dollfus, 68;  
 Eisen, 03; Sapper, 93, 00, 18  
 Santa Maria, eruption, October, 1902: Sapper,  
 03, 04; Winterton, 03

*Physiographic geology.*

- Eastern Guatemala: Powers, 18  
 General: Burkart, 69b; Dollfus, 68; Sapper, 94b  
 Guelph fauna: Whiteaves, 06c; New York: Clarke  
 (J M), 03f  
 Guidebook, western United States: Campbell  
 (M R), 16; Darton, 15; Diller, 15; Lee  
 (W T), 15  
 Gulf of St. Lawrence: Clarke (J M), 11a, 12a; origin:  
 Clarke (J M), 13a  
 Gulf of Mexico: Forshey, 78; Hilgard, 71a; basin of:  
 Hilgard, 81  
 Gulf Stream, effect on Florida: Le Conte, 57  
 Gulkana River region, Alaska: Moffit, 12  
 Gumbotil: Kay (G F), 16f  
 Gunflint district, Ont.: Trueman, 11  
 Gunnison gold belt, Colo.: Lakes, 06b  
 Gunnison Valley, Mesa and Delta cos., Colo.:  
 Woodruff, 12b  
 Gwinn district, Mich.: Allen (R C), 14d  
 Gypsum. *See also names of gypsum-producing  
 States.*  
 Distribution of gypsum deposits: Burchard,  
 11b  
 General: Eckel, 06; Grimsley, 99, 05a; Hunt,  
 60; Stone (R W), 16, 17; Surr, 11b  
 Origin: Branson, 15, 15a; Cole (L H), 13; Daw-  
 son (J W), 48; Gould, 02a; Grimsley, 04,  
 04c, 05; Hubbard (L L), 95; Hunt, 60b,  
 67f; Jones (J C), 12a; Rogers (A F), 12c;  
 Sherwin, 03a; Wallace (R C), 14a  
 Southern States: Wilder, 14  
 United States: Adams (G I), 04a  
 Gypsum, optic angle: Kraus, 12  
 Gypsum and salt deposits, origin: Branson, 15a  
 Gyrolite from Greenland: Böggild, 08  
 Hadrosauridae: Cope, 83k  
 Hadrosaurus: Leidy, 58g, 70h; Marsh, 72c; pelvis:  
 Hawkins, 75  
 Hague, Arnold, biography: Diller, 17; Iddings, 18  
 Hague, J. D., biography: Raymond (R W), 09  
 Hahns Peak gold field, Colo.: Gale, 06

Hahns Peak region, Colo.: George (R D), 09b  
 Haiti.

General: Tuppenhauer, 99, 09

*Economic geology.*

Mineral resources: Ferguson (E G W), 09

*Historical geology.*

General: Jones (W F), 18

*Palaeontology.*

Miocene: Guppy, 76  
 Oligocene: Pilsbry, 10

*Physical geology.*

Earthquake sounds: Scherer, 12a  
 Earthquakes: Scherer, 11, 12

Hall, C. M., biography: Upham, 03a, 04f

Hall, C W, biography: Martin (L), 13a; Winchell  
 (N H), 12

Hall, James, biography: Barrois, 99; Clarke (J M),  
 99f; Emerson (B K), 96; Gratacap, 98;  
 Hovey (H C), 99; McGee, 96c; Nevius, 98;  
 Stevenson, 00; Anon, 84

Hallopoda: Marsh, 90a

Hallopus: Huene, 08a

Hallopus beds: Williston, 05

Halloysite, Georgia: Watkins, 13a

Hammondsport quadrangle, N. Y.: Luther, 06a

Hancock quadrangle, Md.-W. Va.-Pa.: Stose, 12b

Hanging valleys.

California, Sierra Nevada: Turner, 00c; Yosemite:  
 Branner, 03a; Johnson (D W), 11

Colorado, Georgetown: Crosby, 03a

General: Davis (W M), 07c; Gilbert, 00c; John-  
 son (D W), 09a; Russell, 05b; Upham,  
 05a

Idaho, southeastern: Mansfield, 11a

New York: Spencer (J W), 12a; Finger Lake  
 region: Tarr, 04a, 05b

Hanover district, N. Mex.: Paige, 09

Hanover glacial dam, Ohio: Carney, 07d

Hanover quadrangle, N. H.: Hitchcock (C H), 08

Harbors, geological history: Shaler, 93

Hardness, dark scale: Lane, 12c

Harmony coal field, Utah: Richardson (G B) 09a,

Harney granite, Black Hills: Ferguson (H G), 08

Harney Basin region, Oreg.: Waring, 09

Harney Peak region, S. Dak.: Ziegler, 14b

Harpers Ferry folio, Va.-W. Va.-Md. (no. 10):  
 Keith, 94

Harpers Ferry region: Fontaine, 75a

Harrington, B. J., biography: Adams (F D), 08

Harris, I. H., biography: Schuchert, 03a

Hartford quadrangle, Ky.: Gardner (J H), 12

Hartville folio, Wyo. (no. 91): Smith (W S T), 03

Hartville uplift, Wyo.: Ball (S H), 07a, b, c

Hartt, C. F., biography: Hay (G U), 99; Matthew  
 (G F), 90a; Simonds, 97

Hatcher, J. B., biography: Eaton (G F), 04; Hol-  
 land, 04; Osborn, 06d; Schuchert, 05c;  
 Scott (W B), 04, 06

Hatteras axis: Glenn, 99

Havre district, Mont.: Pepperberg, 09

Hawaiian Islands.

Diamond Head, Oahu, structure: Dall, 01a;  
 Hitchcock (C H), 06b

General: Coan, 89; Cross, 03a; Dana (J D), 50b;  
 Dutton, 84a; Goodrich, 29; Kelley, 41;  
 Stubbs, 01

Genesis: Hitchcock (C H), 88b



## Hawaiian Islands—Continued.

- Leeward Islands: Elschner, 15  
 Maui: Dana (J D), 89a; Halakala crater: Alexander (W D), 70  
 Mohokea caldera: Hitchcock (C H), 06c  
 Molokai: Lindgren, 03f  
 Oahu: Dana (J D), 89a  
 Soils: Lyons (A B), 96; Maxwell, 98  
 Sonorous sand: Bolton, 90, 90a; Kauai: Blake (J), 74  
 Tuff cone, Diamond Head: Hitchcock (C H), 01a  
 Volcanic character: Goodrich, 26

*Economic geology.*

- Mineral resources: Day (D T), 99

*Historical geology.*

- Coral bed, Maui: Winslow, 53  
 Diamond Head: Dall, 04e  
 General: Branner, 03  
 Maui: Dana (J D), 89a  
 Oahu: Dana (J D), 89a; Hitchcock (C H), 00a;  
 Tertiary deposits: Dall, 00; Hitchcock (C H), 15

*Mineralogy.*

- Gabbro, minerals from: Schaller, 12  
 Labradorite, Maui: Dana (J D), 51c  
 Meteorites, fall: Bingham, 45  
 Selensulphur: Brown (G V), 16

*Paleontology.*

- Amastrea: Cooke (C M), 17

*Petrology.*

- General: Dana (E S), 89b  
 Glass basalts: Krukenberg, 77  
 Lavas: Cohen, 80; Cross, 11a, 13, 15; Maxwell, 98;  
 Kilauea: Jackson, 46b  
 Magmatic differentiation: Daly (R A), 11b  
 Molybdenum, occurrence: Ferguson (J B), 14  
 Nepheline melilite basalt, Oahu: Merrill (G P), 00b  
 Pele's hair, analysis: Phillips (A H), 94  
 Stalagmite, lava caves: Phillips (A H), 94  
 Trachyte, Hawaii: Cross, 04  
 Volcanic products: Goldsmith, 94  
 Volcanic rocks: Silliman, 29a, 31

*Physical geology.*

- Aphrolith and dermolith: Jaggar, 17c  
 Denudation: Mann, 66a  
 Earthquake, Oahu: Alexander (W D), 71  
 Earthquakes, 1868: Wood (H O), 14a  
 Formation of islands: MacCaughey (V), 18  
 Index of danger from volcanoes: Jaggar, 18  
 Intrusive bodies at Kilauea: Powers, 16e  
 Lava tunnels: Hobbs, 14c  
 Maui: Alexander (J M), 74; Dana (J D), 89a  
 Mohokea caldera: Hitchcock (C H), 03a  
 Oahu: Dana (J D), 89a  
 Pele's hair: Dana (J D), 79b  
 Tectonic lines: Powers, 16f, 17  
 Volcanic craters: Pickering, 06  
 Volcanic phenomena: Williamson, 69  
 Volcano museum, proposed: Jaggar, 16a  
 Volcano observatory: Wood (H O), 13  
 Volcanoes: Brigham (W T), 68; Coan, 74a, 89;  
 Daly, 10; Dana (J D), 49, 50, 90; Dutton, 84; Friedlaender, 18; Goodrich, 33; Green (W L), 84, 90; Hitchcock (C H), 09; Jaggar, 13, 13a, 16, 18a; Kneeland, 73; Komorowicz, 12; Moore (E S), 15; Pickering, 71a; Powers, 15c

## Hawaiian Islands—Continued.

*Physical geology*—Continued.

- eruptions: Brigham (W T), 68; Coan, 57a, 69, 70a; Dana (J D), 50f; 1868: Brigham (W T), 69  
 Halemaumau: Cowan, 85; Dana (J D), 89;  
 Powers, 16c  
 collapse: Jaggar, 16c  
 ejectamenta: Perret, 13d  
 floating islands: Perret, 13a  
 formations in crater: Perret, 13e  
 lava: Brun, 13  
 lava fields: Heim, 13  
 lava fountains: Perret, 13  
 lava lake: Perret, 13b  
 subsidence phenomena: Perret, 13c  
 Kilauea: Bishop, 92; Brigham (W T), 87, 09,  
 Coan, 53, 54, 56, 63, 64, 70, 71, 80; Couthouy;  
 41; Crampton, 10; Curtis, 13; Dana (J D),  
 87, 87a, e; Day (A L), 13, 14a, 15b; Dodge  
 (F S), 87, 93; Dutton, 83a; Emerson (J S),  
 87; Forbes, 15; Friedlaender, 96; Hawaiian  
 Vol Obs, 14; Hitchcock (C H), 05a; Jaggar,  
 15b; Keep, 93; Kelly, 41; Lyman  
 (C S), 49, 51; Mann, 66; Penck, 12; Powers,  
 15b; Stewart (C S), 26; Van Slyke, 87  
 aa lava: Jaggar, 17b  
 cyclical variation in eruption: Wood (H O),  
 17b  
 discharge: Coan, 79  
 drop-fault crater: Curtis, 15  
 eruptions: Brigham (W T), 91; Coan, 67, 10;  
 Cross, 03a; Dana (J D), 68, 86b, 91a;  
 Hitchcock (C H), 87a, 08a, 09a; Thurston,  
 94  
 explosive ejectamenta: Powers, 16b  
 lava flows: Coan, 56b  
 lava lake, thermal gradient: Jaggar, 17d  
 magmatic gases: Day (A L), 13a  
 model: Daly (R A), 18b; Sayles, 18  
 volcanic phenomena: Jaggar, 17a  
 volcanic research, 1911: Perret, 13g  
 1864-5; Brigham (W T), 67  
 Mauna Loa: Baker (E P), 89; Brigham, 09;  
 Coan, 71, 73, 80, 81; Dana (J D), 56; Dut-  
 ton, 83a; Hitchcock (C H), 00c; Merritt,  
 89; Powers, 15b  
 activity: Day (A L), 17a; 1914-15: Jaggar,  
 15a  
 craters: Alexander (J M), 86; Dana (J D),  
 87e  
 eruptions: Bishop, 87; Brigham (W T), 68b;  
 Coan, 53, 56a, 57, 72, 74, 77, 81a; Dana (J D),  
 52b, 59a, 68, 87b; Friedlaender, 15; Green  
 (W L), 59; Haskell, 59; Jaggar, 15;  
 Lyman (H M), 59, 59a; Miller (W), 56,  
 56a; Weld, 57; 1851: Coan, 52; 1852: Coan,  
 52a; 1899: Wood (Edgar), 99; 1903: Wood  
 (Edgar), 04; 1914, seismic prelude: Wood  
 (H O), 15; 1916: Wood (H O), 17  
 Kahuku flow: Wood (H O), 16c  
 Lava flow: Barton (G H), 84; 1916: Jaggar,  
 17  
 Mokuaweoweo: Wood (H O), 16  
 outbreak: Jaggar, 16b  
 summit crater: Alexander (J M), 88; Brig-  
 ham (W T), 88  
 succession in age: Jaggar, 12a  
 water and magmatic gases: Day (A L), 13a



**Hawaiian Islands—Continued.***Physiographic geology.*

- Coral reefs: Agassiz (A), 89; Couthouy, 42  
 General: Branner, 03; Mann, 66a; Powers, 16f  
 Genesis: Hitchcock (C H), 88b  
 Glaciation, Mount Kea: Bryan (W A), 18  
 Haleakala, crater, East Maui: Mann, 67  
 Kau district: Emerson (J S), 02  
 Kilauea, drop-fault crater: Curtis, 15; lava fields: Heim, 13  
 Oahu: Hitchcock (C H), 00a

*Underground water.*

- Molokai: Lindgren, 03

- Hawaiian volcano museum, proposed: Jaggar, 16a  
 Hawley sheet, Mass.: Emerson (B K), 92  
 Hawn, F., biography: Broadhead, 98a  
 Hawthorn formation, correlation: Vaughan, 14d  
 Hay, Robert, biography: Hill (R T), 97c; Thompson (A H), 98  
 Hayden, F. V., biography: Cope, 88u; Peale, 90; Powell, 89b; White (C A), 93a; Anon, 88a  
 Hayes, C. W., biography: Brooks (A H), 17; White (D), 16a  
 Haystack Hills, Wyo., graphite: Ball (S H), 07f  
 Haystack stock, Mont.: Emmons (W H), 08  
 Hedley district, B. C.: Camsell, 08, 08a, 10a  
 Heilprin, Angelo, biography: Gregory (H E), 09; Levy, 07; Pirsson, 07a; Anon, 07, 07a  
 Helderbergian crinoids: Talbot, 05  
 Helena region, Mont.: Knopf, 13  
 Helicina occulta: Shimek, 05  
 Helictites, Luray Cave: Dolley, 87  
 Hell Creek beds: Brown (B), 07  
 Helodus: Eastman, 09  
 Hematite, frondescant: Winchell (N H), 93f; zonal growth: Sosman, 17  
 Hemicones: Decker, 15a  
 Hemidiorite: Dana (J D), 83c  
 Henry Mountains, Utah: Dana (J D), 80; Gilbert, 77  
 Heptacodon, S. Dak.: Marsh, 94b  
 Herbaceous plants, evolution: Sinnott, 15  
 Hercynian question: Clarke (J M), 89c  
 Herderite crystals, Auburn, Me.: Ford (W E), 12a  
 Herendeen Bay coal field, Alaska: Paige, 06  
 Herrick, C. L., biography: Bawden, 05; Cole (A D), 04, 05; Tigt, 05  
 Herrin quadrangle, Ill.: Savage, 10, 11, 11a; Shaw (E W), 12b  
 Hesperornis: Marsh, 72, 72d; affinities; Marsh, 97a; restoration: Brown (B), 10a  
 Hesperornis regalis: Shufeldt, 15a  
 Hetch Hetchy Valley: Matthes, 12  
 Heterodontosuchus, Triassic: Lucas (F A), 98a  
 High Grade district, Calif.: Stines, 12; Storms, 12a  
 High Plains: Johnson (W D), 01; subsidence basins: Johnson (W D), 99b  
 Highland Valley, B. C.: Evans (H F), 05c  
 Highwood Mountains, Mont.: Pirsson, 05  
 Hilgard, E. W., biography: Smith (E A), 17a  
 Hill, F. A., biography: Halberstadt, 17  
 Hill tops, convexity: Gilbert, 09b  
 Hinde, G. J., biography: O'Connell, 18  
 Hippodophycus: Hall, 72a  
 Hippotherium: Cope, 89

Historical (stratigraphic) geology (general). *For areal see names of States. See also the different systems.*

- American geology: Emmons (E), 54  
 Appalachian coal fields: Rogers (H D), 43b  
 Appalachian region: Rogers (H D), 57b  
 Appalachian system: Hunt, 71a  
 Appalachians, newer and older: Emerson (B K), 13  
 Basis of time divisions: Chamberlin (T C), 98  
 Black shale problem: Grabau, 15c  
 Bryozoa, use in stratigraphy: Bassler (R S), 17a  
 Canada: Marcou, 55c, h  
 Chart: Reid (H A), 81  
 Chronology of Renevier: Am G, 97  
 Circles of deposition: Newberry, 74c  
 Classification, dual nomenclature: Williams (H S), 94  
     formations: Marcou, 97  
     Mississippian: Keyes, 92  
     stratigraphic: Williams (H S), 98, 05a; Willis, 01  
 Classification and nomenclature: Marcou, 88  
     of formations: Winchell (N H), 87a  
     of time divisions: Salisbury, 98b  
 Coal horizons, nature of: Keyes, 94f  
 Coal measures, Arkansas: Keyes, 98a  
 Coal seams, spore-exines of: Thiessen, 18  
 Coastal Plain: Crosby, 12  
 Conformity and unconformity, dynamic relations and terminology: Crosby, 12  
 Contemporaneity of strata: Nicholson, 72b  
 Continental formations of the American Paleozoic: Grabau, 08g, 12f  
 Cretaceous-Tertiary boundary: Brown (B), 14; Matthew (W D), 14; Osborn, 14; Stanton, 14; Stevenson, 75c; Rocky Mountain region: Delafontaine, 76; Knowlton, 14a  
 Criteria for determining time relations: Matthew (W D), 15i  
 Cycles of deposition: Hunt, 74n; Newberry, 74c  
 Cycles of sedimentation: Williams (J L), 91  
 Devonian deposit in Niagaran: Weller, 99a  
 Drift, eastern Mass.: Desor, 52g  
 Formations, cartographic representation: Keyes, 02a; geologic and lithologic: Cross, 02  
 Fossils, comparative value in determining geological age: Marsh, 99b; use in determining age of terranes: Williams (H S), 89a  
 General: Agassiz (A), 59; Bradley, 76a; Broadhead, 79a; Conrad, 39a; Cook (G H), 88a; Cope, 90; Dana (J D), 59, 72a; Daubeny, 89; Eaton (A), 18, 28, 30a, 31b, 32, 32a, 40, 41; Frazer, 86b; Grabau, 99c, 05, 09f; Hall, 42a, 43f, 45b, 52a, b; Hitchcock, (C H), 72c; Hitchcock (E), 53; Hunt, 61a; Keyes, 14n; Lakes, 05; Le Conte, 77; Lyell, 55; Mather, 44, 45; Marcou, 58, 59b, 75; Miller (S A), 77, 89; Newberry, 78g; Owen (D D), 43; Rogers (H D), 44, 44b, 58a, b; Rogers (W B), 60b; Schöpfung, 87; Schuchert, 10, 18d; Smiths Inst, 13; Vanuxem, 29b; Williams (H S), 93a; Willis, 12; Williston, 09a  
 Geologic periods, delimitation: Schuchert, 13d



## Historical (stratigraphic) geology (general)—Con.

- Geologic units: Willis, 01c  
 Geological railway guide: Macfarlane, 79  
 Graptolite shales, shallow water deposits: Grabau, 17a  
 Great Plains region: Darton, 01b; James (E P), 25  
 Gulf Coastal Plain: Hayes, 03a  
 "Hudson River group": Walcott, 90b  
 Initiation of new elements in fossil faunas: Keyes, 00f  
 Interdependence of stratigraphy and paleontology: Sinclair, 10  
 Laboratory exercises in structural and historical geology: Salisbury, 13  
 Lacustrine and marine deposits, method of distinguishing: Matthew (G F), 83a  
 Lake Superior region: Desor, 52c; Foster, 51c; Hall, 51f; Rivot, 55, 56a; Van Hise, 91; Winchell (N H), 83  
 Laramie formation: Cross, 08b  
 Lignitic beds, age: Stevenson, 75c  
 Limestone, sandstone, and shale, relative value for stratigraphic work: Haworth, 94a  
 Lower Paleozoic: Winchell (N H), 88g  
 Magnetic stations, geology: Locke, 46a  
 Mesozoic: Stanton, 09  
 Mesozoic-Paleozoic boundary, western America: Smith (J P), 01a  
 Metamorphic strata, Appalachian region: Rogers (H D), 57  
 Mexican boundary: Hall, 57a  
 Mississippi Valley: Christy, 48; Foster, 69; Jenney, 94; Owen (D D), 43c, 46; upper: Locke, 42; Owen (D D), 52  
 Missouri Valley: Hayden, 71  
 New England: Hunt, 70c  
 New York system: Emmons (E), 46e  
 North America: Rogers (H D), 56  
 Northern States: Eaton (A), 18  
 Ohio Valley: Christy, 48; Lawrence, 43; Owen (D D), 46  
 Oil-bearing and oil-producing formations: Grabau, 18  
 Ordovician subdivisions: Grabau, 12e  
 Ordovician-Silurian boundary: Ulrich, 13  
 Overlap, sedimentary: Grabau, 05, 07; types of: Grabau, 05c  
 Pacific coast region: Tolman, 15  
 Paleozoic: Agassiz (L), 52a; Desor, 52e; Hall, 80  
 Paleozoic seas and barriers: Ulrich, 02  
 Paleozoic series, breaks in: Hunt, 74m  
 Paleozoic-Mesozoic boundary, western America: Smith (J P), 01a  
 Parallelism with Europe of Paleozoic: Verneuil, 47a  
 Passage beds: Rogers (W B), 60d  
 Permian: Owen, 47b  
 Permo-Carboniferous deposition conditions: Case, 18, 18b  
 Piedmont formations, Maryland-Pennsylvania: Mathews, 05  
 Pleistocene: Fuller, 05r  
 Pleistocene-pre-Pleistocene division: Chamberlin (T C), 91  
 Post-Cretaceous, classification: Heilprin, '87c  
 Post-Kansan erosion: Leighton, 17

## Historical (stratigraphic) geology (general)—Con.

- Potomac formation: Marsh, 96e  
 Principles of stratigraphy: Grabau, 13  
 Red Beds: Henning, 13  
 Red color of formations: Brown (A P), 96a  
 Red sandstones of Maine, Nova Scotia, and Lake Superior, age: Jackson, 61  
 Revision of Paleozoic systems: Ulrich, 11a  
 Rock masses: Hunt, 74b  
 Rock-boring animals, geologic significance: Barrows, 17  
 Rocky Mountains: Emmons (S F), 93; Marcou, 58d; Schiel, 55  
 Rounded sands of Paleozoic formations: Van Ingen, 05  
 St. Peter sandstone, origin: Trowbridge, 17a  
 Sandstones of United States, age: Jackson, 50h, 61  
 Shifting of faunas: Williams (H S), 03a  
 Silurian subdivisions: Grabau, 12e  
 Silurian-Ordovician boundary: Ulrich, 13  
 Siluro-Devonian boundary: Clarke (J M), 00e; Williams (H S), 01b  
 Southern States: Featherstonhaugh, 44  
 Stratigraphic geology: Prosser (C S), 03  
 Synchronism of geologic formations: Heilprin, 83, 83a; Nugent, 84  
 Synchronizing strata: Keyes, 97c  
 Terranes, definition: Keyes, 99c  
 Time element: Stanton, 05d  
 Time scale: Williams (H S), 93a, b  
 Time table: Schuchert, 14e  
 Time values: Williams (H S), 01  
 Ulrich's Revision of Paleozoic systems: Hahn, 12b  
 Unconformities, significance: Keyes, 06b; in limestone: Bassler, 15b  
 United States: Blackwelder, 12; Hitchcock (C H), 81a; Lyell, 55; Maclure, 09, 09a, 17, 18; Marcou, 53, 55c, h; Moxon, 43; Rogers (H D), 58a  
     eastern: Maclure, 11; Rogers (H D), 35  
     western: Campbell (M R), 15; Darton, 15; Diller, 15; Le Conte (J L), 68; Lee (W T), 15  
 History. *See also* Surveys.  
 American Geologist: Bain, 16a  
 American geology: Merrill, (G P), 06c  
 Association of American Geologists: Clarke (J M), 03h  
 Black Hills region, geologic investigation: O'Harra, 00a  
 California surveys: Storms, 12c  
 Canada, geological investigation: Ells, 99a  
 Canada Geological Survey: Ells, 96f  
 Contributions of America to geology: Rice (W N), 07  
 Correlation, early: Keyes, 14g  
 Earth structure, growth of knowledge of: Barrell, 18a  
 Economic geology in the United States: Emmons (S F), 10  
 Experimental investigations: Adams (F D), 18  
 Explorations, government: Emmons (S F), 97a  
 General: Geikie, 97; Hartzell, 96; Le Conte, 00; Schuchert, 18d; Stevenson, 99; Westgate, 12



## History—Continued.

- Geographical and geological surveys: Whitney, 75
- Geologic Atlas of United States: Willis, 95a
- Geologic map of the United States: Hitchcock (C H), 87
- Geological progress of twenty-five years: Westgate, 12
- Geological societies in United States: Winchell (N H), 14a
- Geological Society of America: Fairchild, 14; Winchell (N H), 14; organization: Stevenson, 14
- Geological survey of United States: Gilbert, 86c
- Geological surveying, early: Stevenson, 15
- Geological surveys: Hayden, 78b; Powell, 78a; Stock, 96
- Geological work in the Southwest: Gould, 17
- Glacial geology in America: Martin (D S), 99
- Government geologic surveys: Smith (G O), 18a
- Gulf Coastal Plain geology: Smith (E A), 14
- Hall and the Troost manuscript: Clarke (J M), 05f
- Hayden Survey: Bradley, 73a; Hayden, 77d,f
- Indiana: Blatchley (W S), 17
- International Congress of Geologists, American Committee reports: Frazer, 88
- International Geological Congress: Frazer, 97, 97b
- Iowa: Keyes, 15n
- Kentucky, early geological surveying: Bain, 10b
- Kentucky Geological Survey: Bain, 16b
- Lake Superior region: Van Hise, 03; Winchell, (H V), 94
- Maine, geological surveys: Bayley, 90
- Maryland: Clark (W B), 97a
- Massachusetts, Essex Co.: McDaniel, 84
- Mexico: Aguilera, 05
- Michigan: Lane, 04b
- Mineralogy, 1818-1918: Ford (W E), 18
- Minnesota, geological surveys: Winchell (N H), 74c, 89
- Mississippi, surveys: Hilgard, 00
- Missouri, surveys: Broadhead, 01
- Nebraska, geological survey: Barbour, 12b
- New Brunswick: Ells, 87
- New York geological survey: Hall, 83o
- Ohio geological survey: Orton, 93
- Pennsylvania, surveys: Pa Top G S Com, 11
- Petrology: Pirsson, 18
- Recent developments in geology: Butler (G M), 12
- Schoepf's contributions: Williams (G H), 94a
- State geological surveys: Hayes, 11
- Tennessee, geology: Glenn, 12b
- Texas: Hill (R T), 87; progress of investigation: Udden, 16a
- U. S. Geological and Geographical Survey of the Territories, origin and progress: Hayden, 77d
- United States Geological Survey: Irving, 83g; Institute for Government Research, 18; Marcou, 92b; U S G S, 04
- United States National Museum: Merrill, 01b, 05
- Vermont: Secly, 01
- Vertebrate paleontology: Lull, 18c; Sinclair, 12

## History—Continued.

- Virginia geological survey: Hotchkiss, 82d
- War Department surveys: Humphreys, 78, 78a
- Wheeler survey: Wheeler, 74b; Yarrow, 73
- Hitchcock, C. H., biography: Anon, 98a
- Hitchcock, Edward, biography: Hitchcock (C H), 95b; Hitchcock (E), 63; Lesley 77a; Anon, 95a
- Hoag district, Cal.: Stines, 10
- Hog Mountain, Ala.: Aldrich (jr), 08
- Holmes, J. A., biography: Pratt, 16a, b; Anon, 15b
- Holosaurus: Capps, 07
- Holothuroidea.
- Cambrian: Clark (A H), 12, 13a; Walcott, 10
- Eldonia, restoration: Clark (A H), 13
- Holyoke folio, Mass.-Conn. (no. 50): Emerson (B K), 98a
- Homocline and monocline: Daly (R A), 16
- Homocrinus: Kirk, 14
- Honduras.
- General: Baron, 02; Lazo, 93; Thacher, 92
- Economic geology.*
- Gold: Nicholas, 08a; Santa Cruz: Bourdariat, 93
- Mineral resources: Akin, 12
- San Juancito district: Leggett, 89; Nicholas, 08a
- Santa Cruz: Bourdariat, 93
- Historical geology.*
- General: Baron, 02; Sapper, 05a
- Northern Honduras: Powers, 18
- San Juancito district: Leggett, 89
- Santa Cruz: Bourdariat, 93
- Mineralogy.*
- Selenium and tellurium minerals: Dana (E S), 90b
- Paleontology.*
- Mastodon: Leidy, 59a
- Rhaetic plants: Newberry, 88a
- Sphenozamites, San Juancito: Humphreys (E W), 16
- Triassic plants: Newberry, 88h
- Vertebrate remains: Nason, 87
- Petrology.*
- General: Napolski, 04
- Northwestern Honduras: Foye, 18
- Physiographic geology.*
- Northern Honduras: Powers, 18
- Honeoye quadrangle, N. Y.: Luther, 11
- Honeyman, David, biography: Gilpin, 90a; Lawson (G), 90; M (J), 90
- Hoosac Mountain, Mass.: Wolff, 94
- Hoploparia: Whitfield, 07
- Hoplophoneus: Adams (G I), 96
- Hornsilver district, Nev.: Ransome, 09a
- Horse, evolution: Matthew (W D), 13g; Osborn, 05a
- Horses, fossil. *See* Mammalia.
- Hot Bluffs, Nebr.: Rachel, 78
- Hot Springs. *See* Thermal waters.
- Hot Springs region, Alaska: Eakin, 12
- Houghton, Douglass, biography: Bradish, 89; Russell, 04c; Winchell (A), 89e; Anon, 48, 99a
- Hovey, H. C., biography: Clarke (J M), 15d
- Howell, E. E., biography: Gilbert, 11, 12
- Hubbard, Bela, biography: Russell, 04d
- Hubbard, L. L., biography: Lanc, 00e
- Hubbard, O. P., biography: Hovey, 00d; Stevenson, 00b
- Hubbard Glacier, Alaska: Tarr (R S), 07c
- Hudson Bay region: Bell (R), 99b; Low, 05



- Hudson River, geology: Kunz, 13; submarine channel: Dana (J D), 90h; Edwards (A M), 92; Lindenkohl, 91; Spencer (J W), 05; Wright (G F), 05d
- "Hudson River group": Walcott, 90b
- Hudson Valley: Dale, 04a
- Huerfano beds: Hills, 89a, 90a
- Human footprints in limestone: Owen (D D), 42
- Humus acids, geologic action: Julien, 80a
- Hunt, T. S., biography: Dawson (J W), 92; Douglas, 93; Frazer, 93; Laflamme, 92a; Pumphelly, 93b
- Huntington folio, W. Va.-Ohio (no. 69): Campbell (M R), 00a
- Hunton formation, Okla.: Reeds, 11
- Huron folio, S. Dak. (no. 133): Todd, 04
- Huron shales, Ohio: Prosser, 13
- Huronian continental angle: Ayers, 11
- Huronian ice age: Coleman, 07c, 09d, e; Knight (C W), 09a
- Huronian question: Coleman, 02g
- Hyaenodon: Scott, 95a
- Hyatt, Alpheus, biography: Brooks (W K), 09; Crosby, 04d; Dall, 02; Jackson (R T), 13; Mayer, 11; Stanton, 03a; Tarr (R S), 85
- Hydrarchos harlani: Koch (A C), 45a
- Hydrargos sillimanii: Koch (A C), 45
- Hydrocarbon in eruptive rocks: Russell, 78a
- Hydrocarbons.  
Classification: Hutchison, 11  
General: Broadhead, 77  
Ordovician, source of: White (D), 06c  
Utah: Bardwell, 18
- Hydrogeology: Frazer, 74b
- Hydrology, outlines of: McGee, 08
- Hydrology of New York: Rafter, 05
- Hydromagnesite, Atlin, B. C.: Young (G A), 16
- Hydrometamorphism: Merrill (G P), 99
- Hydrothermal alteration: Stephenson (E A), 16
- Hydrozoa.  
Beatricea, Anticosti: Hyatt, 68b  
Cambrian Medusae: Walcott, 10, 11a  
Caunopora: Dawson (J W), 81i  
Cryptozoon: Rothpletz, 15  
Medusae, fossil: Walcott, 98; Cambrian, Coosa Valley, Ala.: Walcott, 96b  
Medusina, Carboniferous, Nebr.: Barbour, 14c, h  
Parapsonema: Fuchs, 05  
Stromatopora: Dawson (J W), 78a, 81i; Nicholson, 78a; Rominger, 86; Ontario: Nicholson, 73a, 74d  
Stromatoporoidea: Dawson (J W), 79; Kirkpatrick (R), 12, 12a; Nicholson, 87; Parks, 08; Walker (A E), 91; Winchell (A), 67; 85b  
Canada: Whiteaves, 96a  
Cryptophragmus: Raymond (P E), 14b  
Guelph formation, Ontario: Parks (W A), 07  
Labechia: Lambe, 99d  
Niagaran: Parks, 08; Spencer (J W), 84  
Ohio: Nicholson, 75b  
Ordovician: Parks, 10  
Silurian: Parks, 09b; Hudson Bay: Parks, 08c  
Structure: Dawson (J W), 79; Kirkpatrick 12b; and classification: Heinrich, 16
- Hyalithes opercula: Ford (S W), 71
- Hyopsodidae: Loomis, 05
- Hypacrosaurus: Brown (B), 13c; Gilmore, 14a
- Hypisodus: Matthew (W D), 02e
- Hypsocrinus: Springer, 06a
- Hyracodon: Lambe, 06d; Scott (W B), 97b; osteology: Scott (W B), 96
- Hyracotherium: Wortman, 96
- Ice action.  
Canada: Bleasdel, 70  
Eroding power: Newberry, 85  
Labrador: Packard (A S), 82  
Ontario: Bleasdel, 76
- Ice age. *See* Glacial geology.
- Ice ages (ancient).  
Alaska, southeastern, Paleozoic: Kirk, 18a  
Banded glacial slates of Permo-Carboniferous age: Sayles, 16  
Carboniferous: Poole, 89  
Cause: Chamberlin (T C), 99a; Humphreys, 13  
Climatic changes due to volcanic dust: Humphreys, 13  
Devonian: Clarke (J M), 15e; Matthew (G F), 12  
Eocene, Colo.: Atwood, 15, 16a, 17  
General: Coleman, 08a-c, 16; Manson, 13; Taber (C A M), 10; Wilson (M E), 13  
Huronian, lower: Coleman, 09d, e, 12c, 15; Hore 10a; Knight (C W), 09a  
Massachusetts, Boston Basin, Paleozoic: Lahee, 14  
Roxbury conglomerate, glacial origin: Sayles, 10  
Squantum tillite: Sayles, 14  
Prince Edward Island, Permian moraine; Bain (F), 87  
Zonal belt hypothesis: Wheeler (J T), 09
- Ice beds, Nome, and Grand Central quadrangles, Alaska: Moffit, 13
- Iceberg theory of drift: Dana (J D) 83; Dobson, 44
- Icebergs.  
Formation: Helland, 79  
General: Bell, 87a; Couthouy, 42a; Hayes (J L), 43; Tarr (R S), 09  
Greenland: Hobbs, 10a
- Ice caves: Miller (A M), 13; Washington, Mount Adams: Condon, 96a
- Ice crystals, fossil: Udden, 18
- Ice erosion theory: Fairchild, 05
- Ice field movements: Drygalski, 97; Meigs, 80
- Iceland spar, Montana: Parsons (C L), 18
- Ice phenomena: Bell (R), 87a; Rice Lake: Dumble, 58
- Ice ramparts. *See* Lake ramparts.
- Ice River district, B. C.: Allan, 11, 12a
- Ice-sheet erosion: Tyrrell, 11a
- Ice structure, experimental studies: Von Engeln, 15
- Ice work.  
Labrador, northeastern coast: Hind, 77  
Newfoundland: Milne, 76
- Ichnology: Hitchcock (C H), 89, 98; Hitchcock (E), 44d, 61a, 66a
- Ichthyodectes: Hay (O P), 93a
- Ichthyodorulite, N. Y.: Hopkins (W), 55
- Ichthyornis: Marsh, 72n
- Ichthyosauria, evolution: Osborn, 05b; Triassic, limb structure: Merriam, 05c



## Idaho.

Atlanta Mountain region: Thomson, 86  
 General: Bell (R N), 04a; Emmons (S F), 93;  
 Newberry, 81a  
 Graphitic anthracite, Parker mine, Wood River:  
 Jenney, 89

*Economic geology.*

Antimony, central Idaho: Bell (R N), 18;  
 Coeur d'Alene district: Brainard, 16  
 Asbestos deposits, Kamiah region: Diller, 11  
 Association of igneous intrusions with ore  
 bodies: Bell (R N), 08  
 Atlanta district, Elmore Co.: Bell (R N), 08a,  
 16; Clayton, 77; Hastings, 95  
 Bayhorse district, Custer Co.: Bell (R N), 00  
 Bear River Range lead and copper deposits:  
 Richards (R W), 11  
 Bitterroot Range: Lindgren, 03b, 04b  
 Boise Basin: Hastings, 94; Jones (E L), 16a;  
 Nye, 00  
 Boise quadrangle: Lindgren, 98  
 Boise Ridge: Lindgren, 98a  
 Buffalo Hump district: Flagg, 13a; Whittle, 99  
 Cement materials: Eckel, 13  
 Clearwater Mountains: Lindgren, 03b, 04b  
 Coal deposits: Ritter, 06b  
 Goose Creek district, Cassia Co.: Bowen  
 (C F), 13a  
 Horseshoe Bend and Jerusalem Valley:  
 Bowen (C F), 13  
 Orofino field: Lupton, 15  
 southeastern Idaho: Schultz, 18  
 Teton Basin field, Horseshoe Creek district:  
 Woodruff, 14  
 Cobalt, Lemhi Co.: Umpleby, 13  
 Coeur d'Alene district: Auerbach, 08; Calkins,  
 09a; Clark (W C), 00; Finley (J R), 03;  
 Huston, 11, 12, 15; Ingalsbe, 13; Ransome,  
 05a, c, 08; Rowe, 08a, g; Wiard, 09  
 enrichment: Shannon (E V), 13  
 Hecla mine: Allen (R H), 10a  
 origin and distribution of ore: Hershey, 13, 16  
 silver-lead: Clayton, 88  
 Success zinc-lead deposit: Hershey, 17, 18;  
 Moore (S R), 18; genesis: Umpleby, 17a  
 Copper: Weed, 06  
 Bear River Range: Richards (R W), 11  
 Coeur d'Alene district: Huston, 15; Ransome  
 08; Ray, 15; Rowe, 08a, g  
 Custer Co.: Umpleby, 13b  
 Fort Hall district: Weeks, 08a  
 Lemhi Co.: Umpleby, 13  
 Loon Creek district: Umpleby, 13a  
 Lost Packer lode: Jennings, 06  
 Mackay: Umpleby, 14d  
 Mineral: Turner, 08a  
 Montpelier, Bear Lake Co.: Gale, 10a  
 northern Idaho: MacDonald (D F), 06  
 Priest Lake district: Courtis, 06a  
 St. Joe River basin: Collier, 06a  
 Seven Devils district: Lindgren, 99; Reid (G  
 D), 07  
 Snake River district: Reid (G D), 07  
 Snow Storm district: Huston, 10  
 western Idaho: Packard (R L), 95  
 White Knob: Kemp, 07a  
 Custer Co.: Bell (R N), 01; Umpleby, 13b

## Idaho—Continued.

*Economic geology—Continued.*

De Lamar mine: Brown (H S), 08  
 Dixie district: Livingston, 14  
 Dollarhide mine: Lakes, 06  
 Elk City district, Idaho Co.: Flagg, 13  
 Fort Hall district: Weeks, 08a  
 Gas and oil prospects near Payette: Wash-  
 burne, 11  
 General: Becker, 85; Bell (R N), 01, 05, 05a  
 Gibbonsville, fault system: Bacorn, 05  
 Gold: DeQuille, 95a; Eldridge, 95; Lincoln, 11c;  
 MacDonald (D F), 06  
 Atlanta district: Bell (R N), 08a, 16  
 Boise Basin: Jones (E L), 16a; Nye, 00  
 Boise region: Lindgren, 98, 98a  
 Buffalo Hump district: Flagg, 13a  
 Caribou Mountain: Van Diest, 88a  
 Central Idaho: Jellum, 08; Maguire, 99  
 Coeur d'Alene district: Auerbach, 08; Ran-  
 some, 08; Rowe, 08g  
 Custer Co.: Umpleby, 13b  
 Deadwood placer mine: Hill (W H), 95a  
 De Lamar mine: Brown (H S), 08  
 Dixie district: Livingston, 14  
 Elk City district: Flagg, 13  
 Finegold of Snake River, origin: Bell (R N), 02  
 Gibbonsville: Lincoln (F C), 12  
 Lemhi Co.: Umpleby, 13  
 Loon Creek district: Umpleby, 13a  
 Lost Packer lode: Jennings, 06  
 Mount Caribou: Kirby, 98  
 Murray belt: Lammers, 07  
 Nampa quadrangle: Lindgren, 04  
 Priest Lake district: Courtis, 06a  
 St. Joe River basin: Collier, 06a; Pardee, 11  
 Snake River: Bell (R N), 02, 07; Hill (J M),  
 15a; Irvine, 08a; Maguire, 99a; Reid (G D);  
 07; Washburn, 00  
 South Mountain: Bell (R N), 07a  
 Southeastern Idaho: Schultz, 13  
 Wagonton: Van Diest, 88a  
 western central Idaho: Lindgren, 00a  
 Gold belt: Hill (W H), 95  
 Gold sand, Snake River: Cross, 85a  
 Idaho Basin: Lindgren, 98a  
 Lead: MacDonald (D F), 06  
 Bear River Range: Richards (R W), 11  
 Coeur d'Alene district: Auerbach, 08; Her-  
 shey, 13; Huston, 12; Ingalsbe, 13; Ran-  
 some, 08; Rowe, 08a, g; Wiard, 09.  
 Custer Co.: Umpleby, 13b  
 Lemhi Co.: Nichols, 13; Umpleby, 13  
 Loon Creek district: Umpleby, 13a  
 Red Cloud mine: Turner (H W), 07b  
 St. Joe River basin: Collier, 06a  
 South Mountain: Bell (R N), 07a  
 Wardner district: Ransome, 12  
 Lead-silver, Dome district: Umpleby, 14  
 Lemhi Co.: Bell (R N), 01  
 Lignite, Goose Creek district, Cassia Co.: Bowen  
 (C F), 13a  
 Loon Creek district: Umpleby, 13a  
 Lost Packer copper-gold lode: Jennings, 06  
 Mackay region: Umpleby, 14b, 17  
 Mica deposits, Latah Co.: Sterrett, 13  
 Microstructure of ore from Frisco mine: Camp-  
 bell (W), 09



## Idaho—Continued.

*Economic geology*—Continued.

- Mine inspector's reports: Bell (R N), 06; Moore (F C), 10  
 Mineral: Turner, 08a  
 Monazite: Lindgren, 97b; Schrader, 10  
 Muldoon district: Finch (E H), 17  
 Mullan: Calkins, 14  
 Murray gold belt: Lammers, 07  
 Nampa quadrangle: Lindgren, 04  
 natural gas, Payette: Washburne, 11  
 Nitrate deposits: Gale, 12; Mansfield, 15  
 Northern Idaho: MacDonald (D F), 06, 09a; Soper, 18  
 Petroleum, Payette: Washburne, 11  
 Phosphate: Bell (R N), 17; Duffield, 10; Gale, 10b; Jones (C C), 07, 13; Richards (R W), 11b, 14a; Schultz, 13, 18; Van Horn (F B), 09; Waggaman, 10; Weeks, 07a, 08c  
 origin: Mansfield (G R), 18  
 Phosphate reserve: Richards (R W), 11b  
 Priest Lake district: Curtis, 06a; Lancaster, 10  
 Quartzburg and Grimes Pass porphyry belt: Jones (E L), 16a  
 Quicksilver, central Idaho: Bel (R N), 18  
 Red Cloud mine: Turner (H W), 07b  
 St. Joe River basin: Collier, 06a; Pardee, 11  
 St. Joe-Clearwater region: Calkins, 13a  
 Salt resources: Breger, 10  
 Sapphires: Bell (R N), 07b  
 Sawtooth quadrangle: Umpleby, 14a  
 Seven Devils district: Beals, 00; Reid (G D), 07  
 Silver: Eldridge, 95; MacDonald (D F), 06  
 Atlanta district: Bell (R N), 08a  
 Coeur d'Alene district: Auerbach, 08; Hershey, 13; Huston, 12; Ingalsbe, 13; Ransome, 08; Rowe, 08a, g; Wiard, 09  
 Custer Co.: Umpleby, 13b  
 De Lamar mine: Brown (H S), 08  
 Dollarhide mine: Lakes, 06  
 Lemhi Co.: Nichols, 13; Umpleby, 13  
 Loon Creek district: Umpleby, 13a  
 Mackay region: Umpleby, 17  
 Mineral: Turner, 08a  
 northern Idaho: MacDonald (D F), 09a  
 Priest Lake district: Curtis, 06a  
 Red Cloud mine: Turner (H W), 07b  
 St. Joe River basin: Collier, 06a  
 South Mountain: Bell (R N), 07a  
 Wardner district: Ransome, 12  
 western central Idaho: Lindgren, 00a  
 Silver City and De Lamar districts: Lindgren, 00a  
 Silver City quadrangle: Lindgren, 04a  
 Silver-lead, Wood River: Blake (W P), 87a  
 Snow Storm district: Huston, 10  
 Southeastern Idaho: Schultz, 13, 18  
 South Mountain: Bell (R N), 07a  
 Sulphur near Soda Springs: Richard (R W), 11a  
 Thunder Mountain district, central Idaho: Bell (R N), 02a, b, c; L'Hame, 01, 03  
 Tin, Lemhi Co.: Umpleby, 13  
 Tungsten ore deposits, Coeur d'Alene: Auerbach, 08, 08a; Rowe, 08g; Lemhi Co.: Umpleby, 13  
 Vein structure in Monument mine, Lemhi Co.: Carr, 09

## Idaho—Continued.

*Economic geology*—Continued.

- Warren, Little Giant mine: Hill (W H), 96  
 White Knob copper deposits: Kemp, 07a  
 Wood River district: Lakes, 05d, 11; Lindgren, 00a, c  
 Yreka district: McCormick, 00  
 Zinc: MacDonald (D F), 06  
 Coeur d'Alene district: Hershey, 13; Ransome, 08  
 Dollarhide mine: Lakes, 06  
 South Mountain: Bell (R N), 07a

*Historical geology*.

- Bear River formation: White, (C A) 95  
 Beckwith and Bear River formations: Mansfield, 16  
 Bitterroot Range: Lindgren, 04b  
 Boise Basin: Hastings, 94; Jones (E L), 16a  
 Boise quadrangle: Lindgren, 93  
 Cabinet Range: Wood (H R), 93  
 Cambrian formations: Burling, 14; Walcott, 08a  
 Canyons, Salmon and Snake rivers: Lindgren, 98d  
 Carboniferous, Teton Range: Bradley, 72b  
 Clearwater Mountains: Lindgren, 04b  
 Coeur d'Alene district: Ransome, 08; Rowe, 08g; Belt and Pelona series: Hershey, 12b  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Cordilleran ice sheet: Stewart (C A), 13b  
 Custer Co.: Umpleby, 13b  
 Eastern Idaho: Umpleby, 12  
 Fort Hall Indian Reservation: Mansfield, 15b, 16b, d  
 General: Bell (R N), 05a; Hayden, 72  
 Geologic map, southeastern Idaho: U S G S Terr, 83a, b, c  
 Georgetown region: Richards (R W), 14a  
 Goose Creek district, Cassia Co.: Bowen (C F), 13a  
 Horseshoe Bend and Jerusalem Valley: Bowen (C F), 13  
 Jefferson limestone: Kindle, 08b  
 Jurassic and Cretaceous, southeastern Idaho: Mansfield, 16c  
 Juratrias: White (C A), 79f; southeastern Idaho: Peale, 79a  
 Leesburg region: Kemp, 97e  
 Lemhi Co.: Umpleby, 13  
 Mackay region: Umpleby, 17  
 Mount Caribou: Kirby, 98  
 Nampa: Emmons (S F), 90b  
 Nampa quadrangle: Lindgren, 04  
 Nez Perce Co.: Russell, 01  
 Northern Idaho: Calkins, 09; MacDonald (D F), 06  
 Orofino coal field: Lupton, 15  
 Prichard formation: Huston, 12  
 St. Joe-Clearwater region: Calkins, 13a  
 Quartzburg and Grimes Pass porphyry belt: Jones (E L), 16a  
 Quebec formation: Bradley, 72a, b  
 Reconnaissance survey: Eldridge, 95  
 St. Joe River basin: Pardee, 11  
 Sawtooth quadrangle: Umpleby, 14a  
 Silver City quadrangle: Lindgren, 04a  
 Snake River plains: Russell, 02a



## Idaho—Continued.

*Economic geology*—Continued.

- Southeastern Idaho: Bradley, 73; Mansfield, 16f; Schultz, 13, 18  
 Southwestern Idaho: Russell, 03  
 Teton Basin field, Horseshoe Creek district: Woodruff, 14  
 Teton Range region: St. John, 79  
 Triassic: Smith (J P), 04a  
 Wayan quadrangle: Mansfield (G R), 16e  
 Western central Idaho: Lindgren, 00a  
 Wood River district: Lindgren, 00c

*Mineralogy*.

- Chrysocolla, Mackay: Umpleby, 14c  
 Cœur d'Alene district: Ransome, 08; Shannon, 18b  
 Custerite, Custer Co.: Umpleby, 13d  
 Epidote and garnet, Seven Devils district: Palache, 99a  
 Gold sand, Snake River: Cross, 85a  
 Gold with scheelite: Silliman (jr), 77  
 Ilvaite, Owyhee Co.: Shannon, 18a  
 Meteorite, Hayden Creek: Hidden, 00  
 Mullanite: Shannon, 18  
 Opal: Kunz, 12  
 Plattnerite, Cœur d'Alene district: Shannon (E V), 13a, 17b; Wheeler, 89  
 Mullan: Yeates, 92  
 Shoshone Co.: Hawkins (J D), 89  
 Powellite: Melville, 91a  
 Pseudomorphs, Shoshone: Rowe, 04a  
 Ptilolite, Challis: Koch (L H), 17a  
 Pyromorphite, Cœur d'Alene district: Shannon (E V), 17

*Paleontology*.

- Astacus, fresh-water Tertiary: Cope, 71i  
 Carboniferous fossils: Girty, 08a  
 Cestraciont spine, Triassic: Evans (H M), 04  
 Cobitidae: Cope, 71i  
 Fish remains, Triassic, Aspen Ridge: Goddard, 07  
 Idaho formation fauna: Merriam, 18d  
 Juratrias, southeastern Idaho: White (C A), 79  
 Mammalia, Idaho formation: Merriam, 18a  
 Mollusca, Truckee group: White (C A), 83i  
 Oak wood, Pliocene: Schuster, 08  
 Ordovician graptolites, Wood River valley: Blackwelder, 13  
 Phosphate beds of Park City formation: Girty, 10  
 Pine nut, Snake River valley: Knowlton, 01a, 02e  
 Pisces, fresh-water, Tertiary: Cope, 71e  
 Plants, Payette formation: Knowlton, 98b  
 Pliocene faunas: Cope, 83m; Merriam, 17a  
 Shark related to Edestus: Hay (O P), 07b  
 Spergen Hill fauna: Meek, 73d  
 Triassic: Smith (J P), 04a; southeastern Idaho: White (C A), 83c  
 Vertebrata: Leidy, 70g

*Petrology*.

- Cœur d'Alene district: Ransome, 08; monzonite: Stewart (C A), 14a  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Idaho Basin, Lindgren 98a  
 Nepheline basalt, Fort Hall Indian Reservation: Mansfield, 15a

## Idaho—Continued.

*Petrology*—Continued.

- Northern Idaho: Calkins, 09  
 Purcell Mountain Range: Daly (R A), 06  
 Silver City mining district: Lindgren, 98b  
 Tuffs, Challis: Julien, 81a  
 Volcanic ash: Merrill (G P), 86a  
 Volcanic rocks: Iddings, 96a

*Physical geology*.

- Bannock overthrust: Richards (R W), 12, 13c  
 Cabinet Range: Wood (H R), 93  
 Cone in cone structure in coal: Woodruff, 13b  
 Southeastern Idaho, structural features: Richards (R W), 13b  
 Thunder Mountain landslide: Baumgarten, 10

*Physiographic geology*.

- Bitterroot Forest Reserve: Goode, 98  
 Canyons, Salmon and Snake rivers: Lindgren, 98d  
 Erosion surface, old: Blackwelder, 12a; Umpleby, 12a, 13c  
 Glaciation, central Idaho: Stone (G H), 00  
 Idaho peneplain, age: Lindgren, 18a; Livingston, 18; Rich, 18b  
 Kellogg region, terraces: Hershey, 12  
 Lava fields: Clearman, 04  
 Lemhi Co.: Umpleby, 13  
 Mackay region: Umpleby, 17  
 Nez Perce Co.: Russell, 01  
 Northern Idaho: Hershey, 12  
 Salmon River Range, extinct glacier: Stone (G H), 93b  
 Snake River plains: Russell, 02d  
 Southwestern Idaho: Russell, 03  
 Sulphur Canyon: Mansfield, 11a

*Underground water*.

- S Snake River plains: Russell, 02a  
 Southwestern Idaho: Russell, 03a

Idaho peneplain, age: Rich, 18c

Idaho Springs district, Colo.: Spurr, 06c

Iditarod-Ruby region, Alaska: Eakin, 14

Igneo-genetic ores: Bain, 06c

Igneous and volcanic rocks. *See also* Intrusions; Magmas; Petrology.

Alabama, northeastern: Brooks (A H), 96; Clements, 96

Alaska: Brooks (A H), 00a; Cessac, 75; Emerson (B K), 04

Anvik-Andreafski region: Harrington (G L), 18

Berners Bay region: Knopf, 11

Bonnifield region: Capps, 12

Broad Pass region: Moffit, 15

Chandler-Koyukuk region: Schrader, 00b

Chitina Valley: Overbeck, 18

Chisana-White River district: Capps, 16

Circle quadrangle: Mertie, 13

Controller Bay region: Martin (G C), 03

Copper River district: Schrader, 01

Cosna-Nowitna region: Eakin, 18

Edgecumbe, hypersthene andesite: Cushing, 97a

Fairbanks quadrangle: Prindle, 13

Fort Hamlin to Kotzebue Sound: Mendenhall, 02

Fortymile quadrangle: Prindle, 09

Glacier Bay: Cushing, 96



## Igneous and volcanic rocks—Continued.

Alaska: Gravina Island: Smith (P S), 15  
 Gulkana-Susitna region: Moffit, 12  
 Hanagita-Bremner region: Moffit, 14  
 Iliamna and Clark lakes region: Martin (G C), 10a  
 Iliamna region: Martin (G C), 12a  
 Innoko district: Maddren, 10  
 international boundary: Cairnes, 14  
 Iron Creek region: Smith (P S), 09a  
 Juneau gold belt: Spencer (A C), 06a  
 Kenai Peninsula: Martin (G C), 15  
 Ketchikan district: Brooks (A H), 02a; Wright (C W), 15  
 Kotsina-Chitina region: Moffit, 09b  
 Lake Clark-central Kuskokwim region: Smith (P S), 17  
 Matanuska Valley: Martin (G C), 12b  
 Mount McKinley region: Brooks (A H), 11; Prindle, 11  
 Muir Glacier region: Cushing, 92  
 Nabesna-White River district: Moffit, 10a  
 Nelchina-Susitna region: Chapin, 18  
 Nizina district: Moffit, 11a  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome and Grand Central quadrangles: Moffit, 13  
 Norton Bay-Nulato region: Smith (P S), 11c  
 Nulato-Council region: Smith (P S), 10a  
 Port Wells district: Johnson (B L), 14  
 Rampart region: Prindle, 06b  
 Ruby-Kuskokwim region: Mertie, 16  
 Seward Peninsula: Collier, 02, 08a; Smith (P S), 13c; southeastern: Smith (P S), 11c  
 Sitka district: Knopf, 12a  
 Solomon and Casadepaga quadrangles: Smith (P S), 10  
 southeastern: Wright (F E), 08  
 southwestern: Spurr, 00  
 Tolovana district: Mertie, 17  
 Turnagain Arm region: Moffit, 06  
 Turnagain-Knik region: Capps, 16a  
 White and Tenana River basins: Brooks (A H), 00  
 Willow Creek district: Capps, 15b  
 Yukon district: Spurr, 98a  
 Yukon-Koyukuk region: Eakin, 14b, 16  
 Yukon-Tenana region: Prindle, 05, 06a, 08  
 Alaska-Yukon boundary: Cairnes, 12a  
 Alberta, Crowsnest volcanics: Mackenzie, 14b  
 Alkaline rocks, genesis: Daly (R A), 18; Smyth, 13a  
 Analyses of rocks: Clarke (F W), 04; Washington, 04a  
 Antigua: Guppy, 11  
 Appalachians: Keith, 94a  
 Archean rocks, origin: Winchell (N H), 98e  
 Arctic regions: Bugge, 10; Haughton, 59  
 Ellesmere and Grinnell lands: Hottedahl, 17  
 Frobisher Bay: Emerson (B K), 79  
 Arizona: Cross, 94b  
 Bisbee quadrangle: Ransome, 04, 04b  
 Bradshaw Mountains quadrangle: Jaggar, 05  
 Buckskin Mountains: Blanchard, 13  
 Carrizo Mountain: Emery, 16  
 Clifton quadrangle: Lindgren, 05

## Igneous and volcanic rocks—Continued.

Arizona: Clifton-Morenci district: Lindgren, 05a  
 Fort Apache region: Reagan, 03b  
 Globe district: Ransome, 03, 04a  
 Grand Canyon: Dutton, 82; Noble, 16; Walcott, 94; Shinumo area: Noble, 10  
 Jerome district: Provot, 16  
 Kofa Mountains: Jones (E L), 15a  
 Mohave Co.: Schrader, 08a, 09  
 Navajo country: Gregory (H E), 17  
 Red Mountain: Atwood, 06  
 San Franciscan field: Robinson (H H), 13  
 Santa Rita and Patagonia Mountains: Schrader, 15  
 Silverbell district: Stewart (C A), 12  
 Sulphur Spring Valley: Meinzer, 13  
 Tucson Mountains: Guild, 05  
 Tumamoc Hills: Tolman, 09  
 Warren district: Bonillas, 16  
 western: Johannsen, 08a; Lee (W T), 08a  
 Yuma Co.: Bancroft (H), 11  
 Arkansas: Kemp, 91a; Williams (J F), 91  
 Magnet Cove: Washington, 00, 01b  
 peridotite: Purdue, 08  
 Pike Co.: Branner, 89  
 southwest-central: Miser, 13  
 Average analyses in defining: Mathews, 17a  
 Average igneous rock: Mead (W J), 14  
 Basalt, spheroidal, origin: Winchell (N H), 94c; structure: Mallet, 75  
 Bermuda Island: Pirsson, 14a, b  
 Biotites and amphiboles: Turner, 99c  
 British Columbia: Camsell, 12  
 Atlin district: Cairnes, 11, 13; Gwillim, 01  
 Beaverdell area: Reinecke, 12, 15  
 Boundary Creek district: Brock, 02, 03; LeRoy, 12, 13a  
 Cascade Mountains: Daly (R A), 06a  
 Cordilleran formations: Daly (R A), 13a  
 coast region: Bancroft (J A), 13  
 Cranbrook area: Schofield, 15  
 East Kootenay: Schofield, 10, 12b, 14  
 Field area: Allan, 14  
 Franklin mining camp, West Kootenay: Drysdale, 15  
 Fraser River valley: Bowen (N L), 14  
 Golden-Kamloops: Daly (R A), 15  
 Graham Island: Ellis, 06b; MacKenzie, 14a  
 Hedley district: Camsell, 10a  
 Ice River district: Allan, 12a  
 International Boundary region: Daly (R A), 03b  
 Kamloops area: Dawson (G M), 95; Ferrier, 95  
 Kyuquot Sound: Clapp (C H), 15  
 Mesozoic: Dawson (G M), 77d  
 Moyie sills: Bailey (P P), 13  
 Nanaimo area: Clapp (C H), 14  
 Nelson area: LeRoy, 12a  
 New Westminster and Nanaimo districts: LeRoy, 03  
 Nicola coal basin: Ellis, 05  
 Portland Canal district: McConneil, 12b  
 Purcell Range: Schofield, 14a  
 Queen Charlotte Islands: Dawson (G M), 80  
 Rossland district: Barber, 04; Bruce, 17a; Drysdale, 15a



## Igneous and volcanic rocks—Continued.

British Columbia: Saltspring and Vancouver islands: Allan, 10  
 Savona area: Rose, 14  
 sills: Daly, 05d  
 Skagit Valley, Yale district: Camsell, 12b  
 Skeena River region: Malloch, 12a  
 Slocan district: LeRoy, 10  
 southern interior: Dawson (G M), 79  
 Texada and Moresby islands: McConnell, 10a, 14  
 Thompson River valley: Drysdale, 14  
 Tulameen district: Camsell, 10  
 Vancouver Island: Allan, 10; Bauerman, 60; Burwash, 18; Clapp (C H), 10, 12, 13b, e; Haycock, 03; Webster, 03  
 Duncan area: Clapp (C H), 14  
 Kyoquot Sound: Clapp (C H), 14e  
 Sicker series: Cooke (H C), 17  
 Sooke and Duncan areas: Clapp (C H) 17  
 Victoria and Saanich quadrangles: Clapp (C H), 11  
 West Kootenay: Dawson (G M), 90; Drysdale, 12; Ymir area: Drysdale, 17  
 Bysmaliths: Iddings, 98b  
 Calcium orthosilicate in norm of igneous rocks: Washington, 15a  
 Calculation of norm: Finlay (G I), 10  
 California: Antisell, 56; Blake (W P), 57; Marcou, 83; Richthofen, 68a; Smith (J P), 10, 16  
 Alleghany district: Ferguson (H G), 14a  
 Angel Island: Ransome, 94  
 Berkeley Hills: Lawson, 02  
 Bidwell Bar quadrangle: Turner, 98  
 Big Trees quadrangle: Turner, 98a  
 Bully Hill district: Boyle, 14  
 Carmelo Bay: Lawson, 93d  
 Coalinga district: Arnold, 08g, 10  
 Coast Ranges: Fairbanks, 92, 94d, 98; Lawson, 95a; Osmont, 05; Turner, 98b  
 Colfax quadrangle: Lindgren, 00  
 Contra Costa Hills: Palache, 93  
 Downieville quadrangle: Turner, 97  
 Eagle Mountains: Harder, 12  
 eastern: Ball (S H), 07; Fairbanks, 96c; Spurr, 03  
 Eldorado Co.: Eckel, 04f  
 El Paso Range and southern Sierra Nevada: Baker (C L), 12  
 Inyo and White Mountains: Knopf, 14a, 18  
 Jackson quadrangle: Turner, 94  
 Klamath region, Hershey, 06  
 Lassen Peak district: Diller, 89  
 Marysville quadrangle: Lindgren, 95  
 Mineral King district: Knopf, 05  
 Mohave desert region: Baker (C L), 11  
 Mojave district: Bateson, 06; DeKalb, 07  
 Mother Lode district: Ransome, 00  
 Mount Diablo: Melville, 91; Turner, 91  
 Napa and Lake cos.: Rath, 85h  
 Nevada City and Grass Valley districts: Lindgren, 96, 96b  
 Nevada Co.: Lindgren, 93b  
 northern: Diller, 86, 97a  
 Pajaro: Reid (J A), 02  
 Placerville quadrangle: Lindgren, 94

## Igneous and volcanic rocks—Continued.

California: Plumas Co.: Turner, 92a  
 Point Bonita: Ransome, 93  
 Point Reyes Peninsula: Anderson (F M), 99  
 Pyramid Peak district: Lindgren, 96a, 97a  
 quicksilver districts: Becker, 88  
 Redding quadrangle: Diller, 06  
 Sacramento quadrangle: Lindgren, 94a  
 San Clemente Island: Smith (W S T), 98  
 San Diego Co., orbicular gabbro: Lawson, 04a  
 San Francisco district: Lawson, 14; Palache, 94  
 San Francisco Peninsula: Lawson, 95  
 San Gabriel Mountains: Arnold, 05  
 San Luis quadrangle: Fairbanks, 04  
 San Luis Obispo Co.: Fairbanks, 95  
 Santa Barbara Co., Point Sal: Fairbanks, 96a  
 Santa Catalina Island: Smith (W S T), 97  
 Santa Cruz Mountains, Miocene diabase: Haehl, 04; Neocene: Ashley, 96  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria district: Arnold, 07d, f  
 Sargent oil field: Jones (W F), 11  
 Shasta Co.: Graton, 10  
 Sierra Costa: Hershey, 00c  
 Sierra Nevada: Lindgren, 11; Ransome, 98; Reyer, 86; Schuster, 87; Turner, 94a, c, 95, 96, 98e, 15a  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora quadrangle: Turner, 97a  
 Southern, Morro Hill: Waring, 17a  
 Spanish Peak, plumasite: Lawson, 03  
 Taylorsville region: Diller, 08b  
 Trinity Co., Carrville district; MacDonald (D F), 13  
 Truckee quadrangle: Lindgren, 97  
 Weaverville quadrangle: Ferguson (H G), 14  
 Canada: Harrington (B J), 79a; Logan, 63; Selwyn, 84  
 Canal Zone: MacDonald (D F), 13a, 15, 16a  
 Caribbean Islands: Fraser, 03a  
 Catoctin belt: Keith, 94a  
 Central America, southern: Sapper, 05a  
 Chemical analyses: Washington, 17; 1884-1900: Washington, 03  
 Chemical and mineral relationships: Iddings, 98a  
 Chemical composition, average: Daly (R A), 10; expressed by diagrams: Iddings, 03  
 Classification: Adams (F D), 91a; Cross, 10a; George (R D), 10; Hobbs, 00; Iddings, 98; Macfarlane, 80; Rice (E R), 10; Richthofen, 68a; Spurr, 00b; Turner (H W), 98f; Turner (S), 07; Tyrrell (G W), 14; Waitz, 09; Washington, 00b; Wicks, 10  
 field: Johnson (J E), 12; Surr, 10  
 geological *versus* petrographical: Cross, 98  
 principles: Waitz, 09  
 quantitative: Cross 12d; modifications: Cross, 12b  
 quantitative mineralogical: Johannsen, 17  
 symbols: Cross, 12a  
 Classification and nomenclature: Bayley, 93c; Cross, 02b  
 Colorado: Cross, 94b; Endlich, 78b; Marvine, 74; Peale, 77a; Zirkel, 77



## Igneous and volcanic rocks—Continued.

Colorado: Alma district: Patton, 12  
 analcite basalt: Cross, 97a  
 Anthracite-Crested Butte quadrangle: Cross, 94a  
 Apishapa quadrangle: Cross, 14; Stose, 12  
 Arkansas Valley: Darton, 06f  
 Aspen district: Spurr, 98, 09a  
 Bonanza district: Patton, 16  
 Boulder Co.: Crawford (R D), 09, 09a; Palmer (C S), 91  
 Alum Hill: Andrews (C I), 98  
 Mount Sugar Loaf: Hogarty, 02  
 Sunset: Breed, 02  
 West Sugarloaf Mountain: Blake (J C), 01; Henry, 03  
 Boulder district: Fenneman, 05b  
 Breckenridge district: Ransome, 11  
 Buffalo Peaks: Cross, 83  
 Castle Rock quadrangle: Richardson (G B), 15  
 central: Peale, 76  
 Central City quadrangle: Bastin, 17  
 Clear Creek region: Underhill (J), 06  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Costilla Co., Grayback district: Patton, 10a  
 Creede district: Emmons (W H), 13d  
 Cripple Creek district: Cross, 95, 98a; Lakes, 95a; Lindgren, 06d; Ritter, 05  
 Custer Co.: Cross, 88c  
 Denver Basin: Emmons (S F), 96  
 Elmore quadrangle: Hills, 99  
 Engineer Mountain quadrangle: Cross, 10  
 Georgetown quadrangle: Ball (S H), 08  
 Gilpin Co.: Bastin, 16  
 Gold Brick district: Crawford (R D), 16  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand River district: Peale, 77  
 Grizzly Peak: Stone (G H), 99a  
 Hahns Peak region, Routt Co.; Gale, 06; George (R D) 09c  
 Lake City district: Cross, 11; Irving, 11a  
 Leadville district: Cross, 86; Emmons (S F), 82, 86  
 La Plata quadrangle: Cross, 99a  
 Magnolia district: Whitaker, 02  
 Monarch and Tomichi districts: Crawford (R D), 10, 13  
 Montezuma district, Summit Co.: Patton, 09  
 Needle Mountains quadrangle: Cross, 05b  
 North Park: Beekly, 15  
 northwestern: White (C A), 89  
 Ophir Loop, diorite: Cross, 96a  
 Ouray quadrangle: Cross, 07a  
 Pikes Peak: Mathews, 95; Cross, 94  
 Platoro-Summitville district: Patton, 18  
 Rabbit Ears region: Grout, 13a  
 Red Cliff region: Means, 15  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rocky Mountains: Hills, 91c  
 Rosita Hills, Custer Co.: Cross, 91b  
 Routt Co.: Fenneman, 06b  
 Salida region: Cross, 95b

## Igneous and volcanic rocks—Continued.

Colorado: San Juan Co.: Comstock, 83  
 San Juan district: Holmes (W H), 77  
 San Luis district: Endlich, 74, 76  
 Silver Cliff and Rosita Hills: Cross, 96  
 Silverton: Van Horn (F R), 00  
 Silverton quadrangle: Cross, 01, 05  
 southern: Endlich, 77; Stevenson, 75  
 southwestern: Cross, 09a  
 Spanish Peaks quadrangle: Hills, 01  
 Spanish Peaks region: Hills, 89, 90b  
 Telluride district: Cross, 98c, 99; Purington, 98  
 Tenmile quadrangle: Emmons (S F), 98  
 Trinidad coal field: Richardson (G B), 10  
 Walsenburg quadrangle: Hills, 00  
 White River district: Endlich, 78  
 Columnar structure: Sosman, 15  
 Composition, average: Knopf, 16b  
 Connecticut: Barrell, 10, 12; Davis (W M), 82b, 91b; Gregory (H E), 09a; Percival, 42; Rice (W N), 06a  
 central: Westgate, 99  
 Cortlandt series: Hobbs, 06  
 crystalline rocks: Gregory (H E), 06a  
 East Haven-Branford region: Hovey, 89  
 granite: Hitchcock (E), 23  
 Lighthouse granite: Ward (F), 09  
 Litchfield: Howe (E), 15a  
 Meriden, ash bed: Davis (W M), 89c  
 New Haven area: Dana (J D), 76, 91, 91c, 92a; Hawes, 76  
 Pomperaug Valley, Newark: Hobbs, 01  
 Preston region: Loughlin, 12  
 Tariffville region: Rice (W N), 86  
 Triassic: Davis (W M), 98  
 Connecticut Valley: Davis (W M), 86a; Hitchcock (E), 47a; trap rocks: Dana (E S), 74; trap tufa: Hitchcock (E), 44b  
 Consanguinity of eruptive rocks: Derby, 93  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Cordilleran region: King (C), 78a; Lindgren, 15a; Zirkel, 76, 77  
 Correlation of potassium and magnesium, sodium and iron in igneous rocks: Washington, 15  
 Costa Rica: Alfaro, 13; Romanes, 12; Peninsula of Nicoya: Romanes, 12a  
 Crystalline groups, southern Appalachians: Keith, 96d  
 Crystalline rocks, genesis: Hunt, 84a  
 Crystallization: Bowen (N L), 15b; Iddings, 89  
 in differentiation: Bowen (N L), 15c  
 in igneous rocks: Hague, 85  
 order of: Bowen (N L), 12b; Ziegler, 13  
 Cuba: Adán de Yarza, 95; DeGolyer, 18  
 Daiquiri district: Kemp, 15a  
 Oriente Province, Firmeza district: Roesler, 16  
 Delaware: Chester (F D), 84a; gabbros: Chester (F D), 90  
 Determination of components: Williams (I A), 05a  
 Diabase, Atlantic region, composition: Hawes, 82; Medford, Mass.: Merrill (G P), 96b  
 Diagrams for chemical composition: Iddings, 03a



**Igneous and volcanic rocks—Continued.**

- Distribution, eastern North America: Williams (G H), 94
- Distribution of elements in igneous rocks: Washington, 08a
- District of Columbia: McGee, 91c
- Duluth gabbro: Grout, 18b, e
- Eruptive, use of term: Lahee, 14c
- Evolution: Bowen (N L), 15b
- Flow breccias: Patton, 15c
- Fortieth parallel: Merrill (N F), 82; Wadsworth, 82a, 84a; Zirkel, 83
- Foyaite-ijolite series, Magnet Cove: Washington, 01
- General: Clarke (F W), 08; Cooper (T), 22; Dana (J D), 43, 46b, 78b; Daly (R A), 14; Diller, 98a; Featherstonhaugh, 32a; Frazer, 76a; Grabau, 13; Hunt, 58a, 64, 75; Iddings, 09, 09a, 11; Irving, 84; Kemp, 95a; Spurr, 03c; Wadsworth, 84; Winchell (N H), 89i; Zirkel, 76
- Genetic relationships: Iddings, 93a
- Georgia: Veatch (J O), 09; Watson (T L), 01b
- Ellijay quadrangle: LaForge, 13
- Graves Mountain: Watson (T L), 12f
- Lumpkin Co.: Watson (T L), 96
- northern: Galpin, 15; Hopkins (O B), 14
- Grain, size of: Lane, 02k, 03c, 05h, 11a
- Grain in igneous rocks, variation: Queneau, 02
- Granites, Atlantic coast: Kemp, 99c; eruptive origin: Keyes, 93m
- Granitic rocks: Hunt, 71b
- Great Basin region: Engelmann, 76; Hague, 84; Spurr, 01b
- Greenland: Böggild, 17; Nordenskjöld, 09
- eastern: Knutsen, 89; Toula, 74
- Julianehaab district: Jessen, 96; Ussing, 11
- northeastern: Nathorst, 01
- northern: Steenstrup, 93
- northwestern: Belowsky, 05
- Nugsuaks Peninsula: Phalen, 04
- Scoresby Sound region: Bay, 96
- southern: Laube, 73; Vrba, 74
- west coast: Kornerup, 79, 81
- Guatemala: Bergeat, 94; Sapper, 94b; Santa Maria: Bergeat, 03; Ordóñez, 02c
- Haiti: Jones (W F), 18
- Hawaii: Dana (E S), 89b; Lyons (A B), 96; Silliman, 29a
- lavas: Cross, 15
- Oahu: Hitchcock (C H), 00a
- trachyte: Cross, 04
- Honduras, northwestern: Foye, 18
- Idaho: Eldridge, 95; Iddings, 96a
- Alder Creek district: Umpleby, 14b
- Boise Basin: Jones (E L), 16a
- Boise region: Lindgren, 98, 98a
- Coeur d'Alene district: Ransome, 08; Stewart (C A), 14a
- Custer Co.: Umpleby, 13b
- Lemhi Co.: Umpleby, 13
- Loon Creek district: Umpleby, 13a
- Mackay region: Umpleby, 17
- Mullan: Calkins, 14
- Nampa quadrangle: Lindgren, 04
- northern: Calkins, 09
- Purcell Mountain Range: Daly (R A), 06

**Igneous and volcanic rocks—Continued.**

- Idaho: St. Joe River basin: Pardee, 11
- St. Joe-Clearwater region: Calkins, 13a
- Sawtooth quadrangle: Umpleby, 14a
- Silver City quadrangle: Lindgren, 04a
- Snake River plains: Russell, 02a
- southeastern: Schultz, 18
- southwestern: Russell, 03
- west central: Lindgren, 00a
- Identification: O'Brien, 03a
- Igneous banding, origin: Grout, 18b
- Igneous intrusive bodies, classification: Daly (R A), 05b
- Internal structures: Grout, 18b
- Iowa: Beyer, 97
- northwestern: Beyer, 93
- Sioux quartzite: Keyes, 93o
- Kansas: Hay (R), 83; granite: Powers, 17a
- Kentucky, Crittenden Co., peridotite: Diller, 92a
- Elliott Co., peridotite: Diller, 86a, 87, 89a; Phalen, 08a, 12
- Keweenawan rocks: Winchell (A N), 08
- Lake Superior region: Foster, 51g; Irving, 83f; Lawson, 93a; Van Hise, 11; Whittlesey, 76; Winchell (N H), 95o
- Lavas, Great Basin region: Spurr, 00a
- Maine: Emmons (W H), 10a; Hitchcock (C H), 61
- Androscoggin Co.: Merrill (G P), 92
- Androscoggin River headwaters: Huntington, 78
- Aroostook area: Gregory (H E), 99, 00
- Cobscook Bay: Shaler, 86
- Eastport quadrangle: Bastin, 14
- Fox Islands: Smith (G O), 95, 96, 02a
- Litchfield, eleolite syenite: Bayley, 92
- Little Deer Island: Merrill (G P), 88a; peridotite: Merrill (G P), 89b
- Monhegan Island: Lord, 00a
- Mount Desert Island: Shaler, 89a
- North Haven, spherulites: Bayley, 95
- Ogunquit: Keeley, 14
- Penobscot Bay quadrangle: Smith (G O), 07d
- Perry district: Smith (G O), 05
- Rockland quadrangle: Bastin, 08a
- southern: Hitchcock (C H), 62; Ogilvie, 07
- southwestern: Katz, 17a
- Manitoba, Wekusko Lake area: Alcock, 18
- Martinique: Diller, 02d; Giraud, 02, 18; Hillebrand, 02a; Lacroix, 02d, 07, 07a
- Pelé obelisk: Heilprin, 06
- tridymite, in volcanic rocks: Lacroix, 05b
- Maryland: Clark (W B), 97b; Williams (G H), 90f
- Baltimore area: Williams (G H), 84b, 85c, 86, 92a
- Cecil Co.: Bascom, 02
- granites: Keyes, 93d, 95i
- Howard Co.: Hobbs, 88a
- metamorphosed eruptives: Hobbs, 92b
- northeastern: Keyes, 95i
- Piedmont area: Mathews, 02a, 04
- South Mountain: Williams (G H), 92
- Tolchester quadrangle: Miller (B L), 17



## Igneous and volcanic rocks—Continued.

Massachusetts: Davis (W M), 82b; Emerson (B K), 90a, 08, 17  
 Berkshire Co.: Emerson (B K), 99  
 Blue Hills complex: Barrell, 16b  
 Boston Basin: Crosby, 93; White (T G), 97; diabase dike: Hobbs, 88  
 Boston region: La Forge, 09  
 Braintree: Dodge (W W), 83  
 Cheshire: Martin (G C), 98  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 eastern: Crosby, 80; Diller, 81; Dodge (W W), 75; Loughlin, 11  
 Essex Co.: Clapp (C H), 10a; Eakle, 98b; Sears, 93, 93a, 94b, 98, 05; Wadsworth, 85b; Washington, 98, 98b, c  
 Hampshire Co.: Emerson (B K), 98  
 Hingham: Crosby, 92a, 94  
 Holyoke quadrangle: Emerson (B K), 98a  
 Holyoke trap sheet, plumose diabase: Emerson (B K), 05  
 holyokeite: Emerson (B K), 02b  
 Medford, pegmatite in diabase: Jaggar, 98  
 Nahant: Lane, 89  
 Nantasket area: Merrill (G P), 93a  
 Neponset Valley: Bascom, 00; Crosby, 05c  
 Newburyport: Clapp (C H), 09a  
 Pigeon Cove: Keeley, 14  
 Quincy: Wolff, 84  
 Worcester area: Perry (J H), 03  
 Massive rocks, texture: Becker, 87a  
 Mechanics of igneous intrusion: Daly (R A), 03  
 Metamorphism: Leith, 15  
 Mexico: Aguilera, 09b; Guild, 06; Ordóñez, 97a; Philippi, 07; Villada, 99; Villafañá, 07; Virlet d'Aoust, 66  
 Baja California: Wittich, 09  
 Ceboruco Volcano: Ordóñez, 94a  
 Chiapas and Tabasco: Böse, 05; Ordóñez, 05; Sapper, 94c, 96a  
 Coahuila: Cross, 93  
 Colima: Waitz, 06b  
 Cuenca de Mexico: Ordóñez, 95  
 Durango: Farrington, 04; San Pedro del Gallo: Burckhardt, 10a; Waitz, 10  
 Guanajuato: Monroy, 88; Guanajuato district: Botsford, 10a; Silao: Wittich (E), 10a, i  
 Guaymas district: Hovey, 06  
 Guerrerero: Bonillas, 18; Paredes, 18  
 Hidalgo: Barcena, 77b  
 Pachuca: Ordóñez, 97b  
 Tulancingo: Gálvez, 16; Villarello, 02  
 Isthmus of Tehuantepec: Barroso, 77  
 Jorullo: Ordóñez, 06e  
 Lower California: Lindgren, 91; Ritter, 95a; Wittich (E), 09  
 La Paz: Angermann, 04  
 Todos Santos Bay: Lindgren, 89, 90  
 Puebla, Tehuacán: Böse, 16a  
 Matehuala, San Luis Potosi: Spurr, 12a  
 Mexico, Acambay-Tixmadeje: Urbina, 13  
 Michoacán: Caballero, 10; San Andrés: Sausure, 58  
 northeastern: Garfias, 17  
 northern: Rémond, 66; Ruxton, 50

## Igneous and volcanic rocks—Continued.

Mexico: Nuevo León: Cross, 93  
 Puebla: Hoppe, 99; Ordóñez, 06  
 rhyolites: Ordóñez, 00a  
 Rio Verde region: Waitz, 12  
 Sierra de Concepción del Oro: Burckhardt, 06a  
 Sierra de Guanajuato: Villarello, 06h  
 Sierra de Mazapil et Santa Rosa: Burckhardt, 06b  
 Sierra de Santa Catarina: Waitz, 10b  
 Sierra Madre: Böse, 01; Warwick, 06  
 Sierra Verde, basalt: Kroustchoff, 85a  
 Sonora, Cananea district: Emmons (S F), 10a; Moctezuma region: Aguilera, 88  
 Tamaulipas, San Jose: Finlay (G I), 04  
 Valley of Mexico: Villada, 04  
 Vclardeña district: Spurr, 08a  
 Veracruz: Ordóñez, 05b; Orizaba district: Böse, 99  
 Xinantecatl: Flores, 06  
 Yucatán: Sapper, 96  
 Zacatecas: Burckhardt, 06  
 Michigan: Lane, 07d  
 Black River section: Gordon (W C), 07  
 Crystal Falls: Clements, 98, 99  
 Huron Mountains: Lane, 08b  
 Isle Royale: Lane, 98  
 Keweenaw Point: Hubbard (L L), 98; Irving, 85  
 Lake Superior area: Van Hise, 93e  
 Marquette region: Van Hise, 95; Williams (G H), 90  
 Menominee region: Williams (G H), 90  
 Michigamme district: Clements, 95  
 Mount Bohemia: Wright (F E), 09b  
 Penokee series: Irving, 92  
 Sturgeon River tongue: Bayley, 99  
 Upper Peninsula: Allen (R C), 15; Clements, 99a; Rominger, 81; copper region: Foster, 50a  
 Minnesota: Bowles, 18a; Daly (R A), 05d; Streng, 77; Wadsworth, 87; Winchell (A), 89b; Winchell (N H), 85g, 89i, 00a, b  
 cupriferous series: Winchell (N H), 82c  
 Duluth rocks: Grout, 18e  
 east central: Harder, 18  
 Itasca Co.: Culver, 94  
 Keewatin, volcanic rocks: Grant (U S), 94b  
 Kekequabic Lake region: Grant (U S), 93a  
 Keweenawan region: Grout, 10a  
 Koochiching granite: Winchell (A N), 97a  
 Lake Co.: Winchell (N H), 99a  
 Lake Superior region: Lawson, 93  
 Mesabi iron range: Leith, 03; Winchell (N H), 99a, 09  
 northeastern: Elftman, 94; Grant (U S), 93, 94; Winchell (A N), 00  
 Akeley Lake region: Bayley, 92a  
 gabbro: Bayley, 95a; Elftman, 95  
 Keweenawan area: Elftman, 98  
 Pigeon Point: Bayley, 89, 93; Daly (R A), 17b  
 St. Croix Dalles: Berkey, 97  
 St. Louis Co.: Winchell (N H), 99a  
 southwestern: Hall (C W), 99  
 Vermilion district: Clements, 03



## Igneous and volcanic rocks—Continued.

Missouri: Haworth, 88, 90, 95  
 Iron Mountain sheet: Winslow, 94a  
 Mine la Motte area: Keyes, 95h  
 Ozark region: Crane (G W), 12; Keyes, 96c  
 Paleozoic eruptive: Winslow, 95b  
 Ste. Genevieve Co.: Shumard (B F), 59b  
 Monchiquites: Pirsson, 96  
 Montana: Iddings, 96a; Lindgren, 86, 91a; Pirsson, 95a  
 Bearpaw Mountains: Weed, 96c  
 Boulder batholith: Billingsley, 17  
 Butte district: Weed, 97, 99c, 12  
 Cascade Co.: Barnett, 16  
 Castle Mountain district: Weed, 96a  
 Crazy Mountains: Stone (R W), 09; Wolff, 85, 92; acmite trachyte: Wolff, 93  
 Dillon quadrangle: Winchell (A N), 14  
 Elkhorn district, Jefferson Co.: Barrell, 01; Weed, 01  
 Elliston field: Stone (R W), 14  
 Fort Benton quadrangle: Weed, 99  
 Gallatin, Jefferson, and Madison cos.: Merrill (G P), 95b  
 Garnet Range: Pardee, 18  
 Helena region: Griswold, 98; Knopf, 13  
 Highwood Mountains: Johnston-Lavis, 96; Pirsson, 05; Weed, 95a, 96d  
 Judith Mountains: Weed, 98  
 Lewis and Livingston ranges: Finlay (G I), 02b  
 Lewistown field: Calvert, 09a  
 Little Belt Mountains: Pirsson, 00; Weed, 99a, 00  
 Little Rocky Mountains: Emmons (W H), 08b; Weed, 96b  
 Livingston quadrangle: Iddings, 94  
 Marysville district: Barrell, 07  
 Musselshell Valley: Bowen (C F), 18e  
 northern: Lindgren, 93a; Mortson, 76  
 northwestern: Calkins, 09  
 Park Co.: Emmons (W H), 08  
 Philipsburg quadrangle: Emmons (W H), 13b; Calkins, 15  
 Purcell Mountain Range: Daly (R A), 06  
 Saltese: Calkins, 14  
 Sweet Grass Hills: Weed, 95b  
 Three Forks region: Haynes, 16a; Merrill (G P), 93; Peale, 93, 96  
 Yogo Peak: Weed, 95c  
 Natural system of volcanic rocks: Richthofen, 68  
 Nature of intrusions: Russell, 96a  
 Nevada: Spurr, 03  
 Antelope district: Schrader, 13  
 Bullfrog district: Ransome, 10c  
 Carson area: Reid (J A), 11  
 Elko Co.: Schrader, 12  
 Ely district: Spencer (A C), 17  
 Eureka district: Hague (A), 83, 92; Iddings, 92  
 Goldfield district: Hastings, 06a; Ransome, 09, 10a  
 Humboldt Co.: Ransome, 09d  
 Humboldt region: Louderback, 04a  
 Lander Co.: Knopf, 16  
 Lyon and Washoe cos.: Hill (J M), 11  
 National district: Lindgren, 15

## Igneous and volcanic rocks—Continued.

Nevada: northeastern: Emmons (W H), 10  
 Pioche: Pack, 06  
 Reese River basin: Waring (G A), 18  
 Robinson district: Lawson, 06  
 Rochester district: Schrader, 14c  
 Silver Peak quadrangle: Spurr, 06b; Turner, 09  
 southwestern: Ball (S H), 07, 08a  
 Tonapah: Spurr, 03b, 05, 15a  
 Toyabe Range: Emmons (S F), 70  
 Truckee region: Louderback, 08  
 Virgin Valley region: Merriam, 10b  
 Walker River region: Smith (D T), 01  
 Washoe district: Becker, 82, 82a, 87; Hague, 85  
 Yellow Pine district: Hill (J M), 14a  
 Yerington district: Knopf, 18a  
 New Brunswick: Bailey (L W), 05a; Ells, 06c, 08a; Matthew (W D), 95; Powers, 16  
 Burnthill Brook area: Young (G A), 18  
 Curries Mountain: Bailey (L W), 10a  
 Grand Manan Island: Bailey (L W), 71  
 northern: Bailey (L W), 87; Ells, 81; and eastern: Ells, 83  
 St. John: Hayes (A O), 14; Matthew (W D), 94, 94a, 95a, 97  
 southern: Bailey (L W), 72  
 York and Carleton cos.: Bailey (L W), 85a  
 Newfoundland: Murray, 70a  
 Conception Bay: Buddington, 16  
 Notre Dome Bay: Wadsworth, 84c  
 White Bay: Howley, 03a  
 New Hampshire: Daly (R A), 97; Hitchcock (C H), 77  
 Ammonoosuc district: Hitchcock (C H), 04a; Lahee, 16a  
 Belknap Mountains: Pirsson, 05b, 06b  
 Campton: Hawes, 79  
 Hanover district: Merritt, 13  
 Monadnock Mountain: Perry (J H), 04  
 Mount Kearsarge: Perry (J H), 03a  
 Pequawket Mountain: Daly (R A), 96  
 Red Hill: Pirsson, 07; hornblende syenite: Bayley, 92  
 southeastern: Katz, 17a  
 Tripyramid Mountain: Pirsson, 11, 11a  
 White Mountains: Hitchcock (C H), 72, 77d, 94  
 New Jersey: Davis (W M), 82b  
 Beemerville: Kemp, 92d; leucite tinguaitite: Wolff, 02a  
 Brookville: Ransome, 99  
 Franklin Furnace quadrangle: Spencer (A C), 08d; Wolff, 08  
 Highlands: Bayley, 09  
 Hudson Co.: Russell, 80a  
 Newark rocks: Kummel, 99b; Lewis (J V), 07b, c, 08a  
 New York City district: Merrill (F J H), 02  
 Orange Mountain: Heilprin, 85a; Iddings, 86  
 Palisade diabase: Lewis, 08  
 Passaic quadrangle: Darton, 08b  
 Raritan quadrangle: Bayley, 14  
 Sand Hills region: Clark (W B), 97e  
 Trenton quadrangle: Bascom, 09b  
 Warren Co., Jenny Jump Mountain: Westgate, 96  
 Watchung basalt: Fenner, 10b; Nason, 90c



## Igneous and volcanic rocks—Continued.

## New Mexico: Lindgren, 10

Albuquerque district: Bryan, 09; Herrick, 98, 00b

analcite camptonite: Ogilvie, 02a

Burro Mountains: Somers, 15

Cerrillos Hills: Johnson (D W), 03

Deming quadrangle: Darton, 17

Hanover district: Paige, 09

Luna Co.: Darton, 16

Mount Taylor region: Johnson (D W), 07a

Navajo country: Gregory (H E), 17

northeastern: Lee (W T), 12c; St. John, 76

northwestern: Dutton, 85

Ortiz Mountains: Ogilvie, 08

Raton Mesa region: Mertie, 13a

Rio Grande Valley: Lee (W T), 07b

Santa Rita region: Paige, 12d

Sierra Blanca field: Wegemann, 14

Silver City quadrangle: Paige, 16

Tewan Mountains: Iddings, 90

## New York: Hartnagel, 12; Newland, 16

Adirondack Mountains: Alling, 17; Cushing,

96a, 98, 01a, 07a, 15a; Kemp, 96c, 99b, 12c;

Miller (W J), 14b, 16b, 18a; Newland, 08;

Smyth (C H), 99b

anorthosite body: Bowen (N L), 17b; Cushing, 17

eastern: Kemp, 95b

gabbros: Kemp, 94a

Loon Lake: Cushing, 99b

northern: Cushing, 99a

northwestern: Smyth (C H), 95

Saranac Lakes region: Cushing, 02

syenite-granite series: Miller (W J), 18b

Bedford area: Luquer, 96

Blue Mountain quadrangle: Miller (W J), 17

Brewster iron district: Koeberlin, 09

Broadalbin quadrangle: Miller (W J), 11b

Canton quadrangle: Martin (J C), 16

central, peridotite: Smyth (C H), 92

Champlain Valley: Kemp, 91b

Clinton Co.: Cushing, 01; Eakle, 93

Cortlandt and Stony Point: Dana (J D), 84b

Cortlandt series: Berkey, 08c; Kemp, 88b;

Rogers (G S), 11; Williams (G H), 88b, d

eastern: Dale, 99

Edwards district: Newland 17a

Elizabethtown and Port Henry quadrangles:

Kemp, 10c

Essex Co., Essex and Willsboro townships:

White (T G), 94

Gouverneur quadrangle: Cushing, 18

Highlands: Berkey, 07

Lake Bonaparte quadrangle: Buddington, 18

Lake Pleasant quadrangle: Miller (W J), 16a

Little Falls quadrangle: Cushing, 05

Long Lake quadrangle: Cushing, 07

Manhattan Island: Eckel, 99; Julien, 03;

Spuyten Duyvil Creek: Julien, 04

Mineville-Port Henry region: Kemp, 08a

New York district: Merrill (F J H), 02

New York Island: Berkey, 15

Northumberland plug: Cushing, 03, 13; Woodworth, 03

Ogdensburg region: Cushing, 16

Orange Co.: Kemp, 94b; diorite dike: Kemp, 88a

## Igneous and volcanic rocks—Continued.

## New York: Palisade trap: Julien, 07

Paradox Lake quadrangle: Ogilvie, 05

Peekskill region: Williams (G H), 86b, 87a, 88a, b, d

Richmond Co.: Britton (N L), 81a

Rockland Co.: Kummel, 99a

St. Lawrence Co.: Smyth (C H), 96

Saratoga Springs region: Cushing, 14

southeastern: Berkey, 11; Fettke, 14; Mather, 43

Staten Island, serpentine: Hunt, 83g

Syracuse: Williams (G H), 87d, 90d

Thousand Islands region: Cushing, 10a

Watkins-Glen Catatonk district: Williams (H S), 09

Westchester Co.: Merrill (F J H), 05

## Nicaragua: Hayes, 99

canal route: Hayes, 99; Ransome, 99

northeastern: Hershey, 12a

Norites and gabbros: Herrick, 88

North Carolina: Lugeon, 18; Nitze, 97b; Watson, 04d

Chapel Hill: Fry, 11; Smith (J E), 17a

Cranberry quadrangle: Keith, 03

Dan River field: Stone (R W), 12a

Davidson Co.: Pogue, 09b; Cid district: Pogue, 10

dunite beds: Julien, 83a

Gold Hill district: Laney, 10

Kings Mountain district: Keith, 17

Mount Mitchell quadrangle: Keith, 05a

Pisgah quadrangle: Keith, 07a

Roan Mountain quadrangle: Keith, 07b

Virgilina district: Laney, 17; Watson, 02

western: Lewis (J V), 96

Northwest Territory, Great Bear Lake region: Barlow, 01

Nova Scotia: Honeyman, 85a; Malcolm, 12; Marsters, 90; Powers, 16

Antigonish Co.: Honeyman, 86b

Arisaig section: Twenhofel, 09

Arisaig-Antigonish district: Williams (M Y), 12, 14

Cape d'Or, Triassic basalt: Powers, 16a

eastern: Faribault, 87; Fletcher, 87

Halifax, granite contact zone: McIntosh, 15

Kings and Hants cos.: Fletcher, 02

Pictou and Colchester cos.: Fletcher, 92

Shelburne Co.: Powers, 15a

southwestern: Bailey, 95, 98

volcanic bombs: Poole, 08

Yarmouth series: Honeyman, 83

## Oklahoma: Drake, 97

Arbuckle Mountains: Hutchison, 11; Reeds, 10; Taff, 04

Atoka quadrangle: Taff, 02

granite: Taylor (C H), 15

northeastern: Snider, 15

Tishomingo quadrangle: Taff, 03

Wichita Mountains: Bain, 00; Gould, 02, 04a; Taff 04; Vaughan, 99a

## Ontario: Coleman, 07a; Miller (W G), 11

Algoma, Bruce mines district: Ingall, 03a, 05

Animikie iron range: Silver, 06

Bancroft area: Adams (F D), 08a

Beatty-Munro area: Hopkins (P E), 15a



## Igneous and volcanic rocks—Continued.

Ontario: Cobalt district: Hore, 10  
 Dryden gold area, district of Kenora: Thomson, 18  
 Dungannon: Adams (F D), 96b  
 eastern: Ells, 04d  
 Gowganda district: Bowen (N L), 10; Collins (W H), 09  
 Gowganda to Porcupine area: McMillan, 12  
 Grenville region: Ells, 01a; Harrington, 77  
 Haliburton Co., Glamorgan; Graton, 03a; nephelite syenite: Foye, 15  
 Haliburton-Baneroft area: Foye, 16  
 Hunters Island: Smith (W H C), 92a  
 Kingston district: Miller (W G), 97  
 Kirkland Lake and Swastika gold areas: Burrows (A G), 14  
 Kowkash area: Hopkins (P E), 17  
 Lake Huron region: Coleman, 14  
 Lake Nipigon district: Moore (E S), 11; Wilson (A W G), 09, 10  
 Lake Nipigon iron ranges: Coleman, 07, 08e  
 Lake of the Woods region: Lawson, 85  
 Lake Superior region: Collins (W H), 09b; Lawson, 91b; Macfarlane, 66a, 67  
 Matachewan area: Burrows (A G), 18  
 Mattagami Valley: Kerr, 06  
 Michipicoten Bay: Tight, 87  
 Michipicoten iron ranges: Coleman, 02c, 06  
 Michipicoten Island: Burwash, 05  
 Moose River basin, Huronian: Parks, 00  
 nepheline rock: Adams (F D), 04a  
 Nipigon Basin: Wilson (A W G), 09, 10  
 Nipissing district: Hore, 11  
 Nipissing-Timiskaming area: Barlow, 99  
 northwestern: Collins (W H), 08a  
 Onaman ranges: Moore (E S), 08  
 Onaping area: Collins, 17  
 Poohbah Lake, malignite: Lawson, 96  
 Porcupine area: Burrows (A G), 15  
 Port Coldwell: Coleman, 02i  
 Rainy Lake region: Coleman, 95; Lawson, 88, 13d  
 St. Ignace Island: Robb, 82  
 Slate Islands: Parsons (A L), 18  
 Sudbury district: Barlow, 03, 04; Brackenbury, 14; Coleman, 04d, 05; Daly (R A), 05d; Williams (G H), 91  
 Thousand Islands: Smyth (C H), 94c  
 Thunder Bay district: Bayley, 88  
 Thunder Bay-Algoma boundary region: Parsons (A L), 08  
 Oregon, Blue Mountains: Lindgren, 01  
 Cascades: Smith (W D), 17  
 central: Russell, 05  
 Columbia River gorge region: Williams (I A), 16a  
 Coos Bay quadrangle: Diller, 01  
 Crater Lake National Park: Diller, 02  
 Curry Co.: Butler (G M), 16  
 Grants Pass region: Diller, 09a  
 Harney Basin region: Waring (G A), 09  
 John Day Basin: Calkins, 02  
 Portland region: Darton, 09b  
 Port Orford quadrangle: Diller, 03  
 Roseburg quadrangle: Diller, 98  
 south central: Waring (G A), 08

## Igneous and volcanic rocks—Continued.

Oregon, Blue Mountains: southeastern: Russell, 03  
 southwestern: Diller, 14a; Winchell (A N), 14a  
 Sumpter quadrangle: Pardee, 14  
 Origin: Daly (R A), 14; Iddings, 92a; Richt-hofen, 68a  
 augite andesite: Daly (R A), 08  
 Coleraine area, Quebec: Knox, 18  
 Ozark region: Adams (G I), 01  
 Palisades, trap rock: Lyman, 96a  
 Panama: Hayes, 11c; Hershey, 01d; Howe, 07, 08  
 Panama Canal Zone: MacDonald (DF), 13a, 15, 16a  
 Pegmatites, origin: Julien, 01b  
 Pele's hair: Dana (J D), 79b  
 Pennsylvania: Frazer, 75e; Kemp, 07b; Miller (B L), 12a; Rogers (H D), 58  
 Adams Co.: Frazer, 75i  
 Bucks Co., gabbro: Kemp, 93g  
 Chester Co., Doe Run-Avondale region: Bliss (E F), 16  
 Coatesville quadrangle: Bliss (E F), 14  
 Dauphin and Cumberland cos.: Gibson, 25  
 eastern: Jonas, 17  
 Easton, serpentine and tale: Peck, 01  
 Gettysburg: Frazer, 75j; Triassic: Stose, 16  
 Lancaster Co.: Frazer, 79  
 Mercersburg-Chambersburg district: Stose, 09  
 Montgomery Co.: Goldsmith, 98  
 Philadelphia district: Bascom, 09a; serpen-tines: Jonas, 05  
 Piedmont district: Bascom, 05, 09, 15  
 Port Coldwell: Kerr, 10  
 pre-Cambrian gneisses, of Piedmont plateau: Bascom, 09  
 southeastern: Fraser, 82; Bascom, 96b  
 South Mountain: Bascom, 93, 96, 97a; Wil-liams (G H), 92  
 Trenton quadrangle: Bascom, 09b  
 York Co.: Ehrenfeld, 98; Frazer, 75i  
 Perknites: Turner, 01  
 Petrogenesis: Daly (R A), 13b  
 Phenocrysts: Pirsson, 99; origin: Crosby, 00e  
 Phosphoric acid in: Schiel, 61  
 Piedmont Plateau, granitic rocks: Williams (G H), 95  
 Pillow lava, origin: Lewis (J V), 14  
 Porto Rico: Berkey, 15a  
 Prismatic structure, types of: Sosman, 16  
 Quantitative classification: Mathews, 03; Wash-ington, 18  
 Quantitative distribution of rock magmas: Washington, 03a  
 Quantitative mineralogical classification of gradational rocks: Lincoln, 13  
 Quebec: Hunt, 59, 60a; Valiquette, 12  
 asbestos district: Harvie, 13  
 Bell River region: Wilson (M E), 14  
 Brome Mountain: Dresser, 02a, 04b, 06d  
 Buckingham area: Wilson (M E), 14a  
 Chibougamau region: Barlow, 11c; Low, 03a  
 Coleraine area: Knox, 18  
 eastern townships: Dresser, 02e, 06c Ells, 87a, 88



## Igneous and volcanic rocks—Continued.

- Quebec: Gaspé Co., Lemieux: Mailhiot, 18  
 Gaspé Peninsula: Ells, 83a, 85; Low, 85  
 Haliburton and Bancroft areas: Adams (F D), 10d  
 Keekeek and Kewagama lakes region: Bancroft (J A), 12a  
 Kewagama Lake area: Wilson (M E), 13c  
 Labrador Peninsula: Ferrier, 96  
 Lake Timiskaming area: Wilson (M E), 10a  
 Lake St. John district: Dresser, 16  
 Laurentian highlands: Wilson (M E), 13b  
 Magdalen Islands: Clarke (J M), 11b  
 Mistassini region: Low, 85a  
 Monteregian Hills: Adams (F D), 05, 13a  
 Montreal area: Bigsby, 25; Ells, 96; Harvie, 10; Lacroiz, 90  
 Mount Orford: Dresser, 01b  
 Mount Yamaska: Young (G A), 06  
 Nipissing-Timiskaming area: Barlow, 99  
 Northern Transcontinental Railway, Hervey Junction-Doucet: Bancroft (J A), 17  
 Ottawa region: Gordon (C H), 95b; Osann, 02  
 Portneuf, Quebec, and Montmorency cos.: Low, 92a  
 St. Bruno Mountain: Dresser, 10a  
 St. Francis Valley: Dresser, 06  
 St. Hilaire and Rougemont mountains: O'Neill, 14  
 Shefford Mountain: Dresser, 02, 02a  
 southern: Dresser, 10b, 13  
 southeastern: Dresser, 07  
 Temiscouata Lake: Gregory (H E), 00a  
 Thetford-Black Lake district (Coleraine sheet): Knox, 17  
 Yamaska Mountain: Young (G A), 04  
 Resorption phenomena: Fenner, 10c  
 Rhode Island: Emerson (B K), 07, 17; Hawkins, 15a, 18; Loughlin, 10a; Pirsson, 93a  
 Conanicut Island: Collie, 95; Crosby, 97a  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 Narragansett Basin: Lahee, 12a  
 Rock series: Harker, 00  
 St. Croix: Quin, 07  
 St. Vincent: Diller, 02d; Flett, 08; Hillebrand, 02a  
 Salvador: Hague, 86  
 Santo Domingo: Gabb, 73  
 Segregation under action of gravity: Day (A L), 16  
 Serpentine: Julien, 14  
 Silicates, constitution: Clarke (F W), 14  
 Solidification of alloys and magmas: Aston, 09  
 South Carolina: Graton, 06a; Lieber, 60; Tuomey, 48  
 Pisgah quadrangle: Keith, 07a  
 South Dakota, Black Hills: Carpenter (F R), 88; Caswell, 80; Crosby, 88a; Darton, 09; Ferguson (H G), 08; Jaggar, 01; Newton, 80; Russell, 96; Van Hise, 90; northern: Irving, 99; Jaggar, 04c  
 Minnehaha Co., olivine diabase: Culver, 92a  
 Summation of chemical analyses of igneous rocks: Robinson (H H), 16  
 Study of: Iddings, 09a

## Igneous and volcanic rocks—Continued.

- Symbols in quantitative classification: Cross, 12a  
 Tennessee, Johnson Co.: Jenkins, 16  
 Roan Mountain quadrangle: Keith, 07b  
 Texas: Udden, 16a  
 Apache Mountains: Osann, 96  
 Brewster Co.: Hill (B F), 02  
 central: Comstock, 90; Hill (R T), 90h  
 Chisos country: Udden, 07a  
 El Paso quadrangle: Richardson (G B), 09  
 Llano-Burnett region: Paige, 10, 11, 12  
 Rio Grande Plain: Hill (R T), 98b  
 San Carlos: Lord, 00  
 Thrall oil field: Udden, 16b  
 trans-Pecos: Osann, 93; front range: Baker (C L), 17  
 Uvalde quadrangle: Vaughan, 00  
 Van Horn quadrangle: Richardson (G B), 14  
 Text-book: Iddings, 09; Finlay, 13  
 Texture, porphyritic: Crosby, 00c  
 Texture variations, Great Basin Tertiary rocks: Spurr, 01b  
 Thermometamorphism: Harker, 92a  
 Tobago: Craig, 07  
 Trap rocks, Connecticut Valley: Hawes, 75a; origin: Silliman, 30  
 Triassic, Connecticut Valley: Davis (W M), 88  
 U. S. National Museum collection: Merrill (G P), 91a  
 Utah: Cross, 94b; Engelmann (H), 58a; Zirkel, 77  
 Beaver Valley: Lee (W T), 08a  
 Bingham district: Keith, 05b  
 Canyon Range: Loughlin, 14  
 Cottonwood-American Fork region: Butler (B S), 15  
 Grand Co., La Sal Mountains: Hill (J M), 13b  
 Henry Mountains: Dutton, 77  
 high plateaus: Dutton, 80  
 Marysville district: Butler (B S), 12b  
 Newhouse and vicinity: Jensen, 08  
 Park City district: Boutwell, 12  
 Salt Lake and Davis cos.: Neal, 96  
 San Francisco district: Butler (B S), 13, 14a  
 San Juan oil field: Woodruff, 12  
 southern: Leith, 08a  
 Tintic district: Crane, 15; Smith (G O), 00; Tower, 99  
 Variation in composition, causes: Walker (T L), 98  
 Vermont: Richardson (C H), 06  
 Ascutney Mountain: Daly (R A), 03  
 Calais, East Montpelier, and Berlin: Richardson (C H), 16  
 Chittenden Co.: Perkins, 08b  
 Craftsbury: Richardson (C H), 12  
 Cuttingsville: Eggleston, 10, 18  
 Grand Isle: Shimer, 02a  
 Greensboro: Richardson (C H), 14  
 Hardwick: Richardson (C H), 14a  
 Irasburg: Richardson (C H), 12b  
 Monticello area: Lambeth, 01  
 Newport, Troy, and Coventry: Richardson (C H), 08  
 western: Dale, 99  
 Woodbury: Richardson (C H), 14a



**Igneous and volcanic rocks—Continued.**

Virginia: Darton, 98b; Watson, 07a, 13g  
 Amherst-Nelson cos.: Watson, 13i  
 Blue Ridge region: Watson, 16; Cambrian  
 extrusive basalt: Watson, 15a  
 central western: Watson 13c  
 Fredericksburg quadrangle: Darton, 94d  
 James River basin: Taber (S), 13  
 Mesozoic rocks: Campbell (H D), 91  
 Monterey quadrangle: Darton, 99  
 Richmond Basin: Shaler, 99a  
 unakite: Phalen, 04a  
 Virgilina district: Laney, 17; Watson, 02  
 Volcanic rocks in the Keewatin: Selwyn, 94  
 Washington: Landes, 02a  
 Blewett district: Weaver, 11  
 Cascade Range: Russell, 00; Smith (G O), 00b,  
 04b  
 central: Russell, 93a; Smith (G O), 03a  
 Colville Indian Reservation: Pardee, 18a  
 Conconully and Ruby districts: Jones (E L),  
 16  
 Covada district: Weaver, 13  
 Ellensburg quadrangle: Smith (G O), 03  
 Index district: Weaver, 12  
 King Co.: Evans (G W), 12  
 Monte Cristo district: Spurr, 01  
 Mount Rainer: Smith (G O), 98  
 Mount Stuart quadrangle: Smith (G O), 04  
 northeastern: Bancroft (H), 14  
 Republic district: Umpleby, 10  
 Sawtooth Range of Olympic Mountains:  
 Arnold, 09  
 Skykomish basin: Smith (W S), 15  
 Snoqualmie quadrangle: Smith (G O), 06b  
 southeastern: Russell, 97d  
 Tacoma quadrangle: Willis, 99  
 western: Weaver, 16  
 Yakima Co.: Smith (G O), 01  
 West Indies: Kloos, 89  
 northeastern: Cleve, 71, 82  
 Wet and dry differentiation: Lane, 10  
 Wisconsin: Buckley, 98; Irving, 83; Weidman,  
 08; Wright (C E), 77a  
 Baraboo district: Weidman, 95, 04  
 central: Weidman, 04a  
 Douglas Co.: Grant (U S), 00  
 Flambeau Valley: King (F H), 82  
 Fox River Valley: Hobbs, 07i; Weidman, 98  
 Lake Superior district: Sweet, 80; Wichman,  
 80  
 Menominee iron region: Brooks (T B), 80  
 north central: Weidman, 07a  
 northern: Pumpelly, 80  
 northwestern: Hotchkiss, 15  
 Penoque range: Wright (C E), 80  
 Penoque series: Irving, 92  
 St. Croix Dalles: Berkey, 97  
 St. Croix district: Strong, 80  
 southeastern: Alden, 18  
 southern: Hobbs, 95c  
 Wisconsin Valley: Irving, 82a  
 Wyoming: Iddings, 96a  
 Absaroka Range: Hague, 99b, c  
 Aladdin quadrangle: Smith (W S T), 5a  
 Bald Mountain and Dayton quadrangles:  
 Darton, 06c

**Igneous and volcanic rocks—Continued.**

Wyoming: Big Horn basin: Fisher (C A), 06  
 Black Hills region: Darton, 09  
 Cloud Peak and Fort McKinney quadrangles:  
 Darton, 06d  
 Crandall Basin: Iddings, 94b, c, 99d  
 Devils Tower quadrangle: Darton, 07b  
 Encampment district: Spencer (A C), 04  
 Fremont Co., Atlantic district: Spencer (A C),  
 16  
 Green River district: Peale, 79  
 Hartville quadrangle: Smith (W S T), 03  
 Laramie and Sherman quadrangles: Darton,  
 10c  
 Leucite Hills: Cross, 97; Kemp, 97a, 03;  
 Schultz, 12  
 Pilot Butte: Cross, 97  
 Sundance quadrangle: Smith (W S T), 05  
 Sweetwater Co.: Schultz, 09  
 western: Comstock, 74; Schultz, 18  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yellowstone National Park: Dutton, 83;  
 Hague, 96a; Holmes (W H), 83; Iddings,  
 90a, 91, 95, 96, 99b, e; Gallatin Mountains:  
 Iddings, 99a  
 Yukon: Cairnes, 08a; Keele, 10  
 international boundary: Cairnes, 14  
 Klondike gold fields: McConnell, 00  
 Kluane district: McConnell, 05a  
 Lewes and Nordenskiöld rivers district:  
 Cairnes, 10a  
 Macmillan River: McConnell, 03  
 upper White River district: Cairnes, 15  
 Wheaton River district: Cairnes, 10  
 Whitehorse belt: McConnell, 09a  
 White River district: Cairnes, 14d; McCon-  
 nell, 06  
 Igneous intrusion. *See* Intrusion.  
 Igneous ores: Gregory (J W), 08  
 Iguanodon: Hay (O P), 09  
 Iguanodont dinosaurs: Osborn, 09d  
 Iliamna region, Alaska: Martin (G C), 12a  
 Illaenidae: Raymond (P E), 08b  
 Illinois.  
 Adams Co.: Worthen, 70  
 Administrative report: Bain, 07d  
 Alexander Co.: Worthen, 68a  
 Bond Co.: Broadhead, 75  
 Boone Co.: Shaw (J), 73  
 Brown Co.: Worthen, 70  
 Bureau Co.: Shaw (J), 73  
 Calhoun Co.: Worthen, 70  
 Carroll Co.: Shaw (J), 73  
 Cass Co.: Bannister, 70  
 Champaign Co.: Bradley, 70  
 Chemical report: Blaney, 66  
 Chicago bedrock topography: Peattie, 14; and  
 vicinity: Bastin, 90  
 Christian Co.: Broadhead, 75  
 Clark Co.: Worthen, 75a  
 Clay Co.: Worthen, 75a  
 Clinton Co.: Englemann (H), 68  
 Coles Co.: Worthen, 75a  
 Cook Co.: Bannister, 68  
 Crawford Co.: Worthen, 75a  
 Cumberland Co.: Worthen, 75a  
 DeKalb Co.: Bannister, 70



## Illinois—Continued.

Douglas Co.: Worthen, 75a  
 DuPage Co.: Bannister, 70  
 Edgar Co.: Bradley, 70  
 Edwards Co.: Worthen, 75a  
 Effingham Co.: Broadhead, 75  
 Fayette Co.: Broadhead, 75  
 Ford Co.: Bradley, 70  
 Franklin Co.: Worthen, 75a  
 Fulton Co.: Worthen, 70  
 Gallatin Co.: Cox (E T), 75a  
 General: Lindahl, 90, 95  
 Geologic survey: Norwood, 53  
 Greene Co.: Worthen, 68a  
 Grundy Co.: Bradley, 70  
 Hamilton Co.: Worthen, 75a  
 Hancock Co.: Worthen, 66a  
 Hardin Co.: Worthen, 66b  
 Henderson Co.: Green (H A), 70  
 Henry Co.: Shaw (J), 73  
 Index to survey reports: Lindahl, 90a  
 Iroquois Co.: Bradley, 70  
 Jackson Co.: Worthen, 68a  
 Jasper Co.: Worthen, 75a  
 Jefferson Co.: Engelmann (H), 68  
 Jersey Co.: Worthen, 68a  
 Jo Daviess Co.: Shaw (J), 73  
 Johnson Co.: Engelmann (H), 66  
 Kane Co.: Bannister, 70  
 Kankakee Co.: Bradley, 70  
 Kendall Co.: Bannister, 70  
 Knox Co.: Green (H A), 70  
 Lake Co.: Bannister, 70  
 La Salle Co.: Freeman (H C), 68  
 Lawrence Co.: Worthen, 75a  
 Lee Co.: Shaw (J), 73  
 Livingston Co.: Freeman (H C), 75  
 Logan Co.: Bannister, 70  
 McDonough Co.: Worthen, 73a  
 McHenry Co.: Bannister, 70  
 McLean Co.: Bannister, 70  
 Macon Co.: Broadhead, 75  
 Macoupin Co.: Worthen, 73a  
 Madison Co.: Worthen, 66a  
 Marion Co.: Engelmann (H), 68  
 Marshall Co.: Shaw (J), 73  
 Mason Co.: Bannister, 70  
 Menard Co.: Bannister, 70  
 Mercer Co.: Green (H A), 70  
 Mining and State geological survey: DeWolf, 12  
 Monroe Co.: Worthen, 73a  
 Montgomery Co.: Broadhead, 75  
 Morgan Co.: Bannister, 70  
 Moultrie Co.: Broadhead, 75  
 Northwestern Ill.: Shaw (J), 73  
 Ogle Co.: Shaw (J), 73  
 Peoria Co.: Chapman (W H), 87; Worthen, 73a  
 Perry Co.: Worthen, 68a  
 Pike Co.: Worthen, 70  
 Platt Co.: Broadhead, 75  
 Pope Co.: Engelmann (H), 66  
 Pulaski Co.: Engelmann (H), 66  
 Putnam Co.: Shaw (J), 73  
 Randolph Co.: Worthen, 66a  
 Reports of State geologist: Bain, 07d; DeWolf, 10, 15  
 Richland Co.: Worthen, 75a

## Illinois—Continued.

Rock Island Co.: Worthen, 73,  
 St. Clair Co.: Worthen, 66a  
 Saline Co.: Cox (E T), 75a  
 Sangamon Co.: Worthen, 73a  
 Schuyler Co.: Worthen, 70  
 Scott Co.: Worthen, 68a  
 Shelby Co.: Broadhead, 75  
 Soil reports: Hopkins (C G), 11  
 Soils: Leverett, 95; Whitney (M), 95; Southern  
 Ill.: Shaw (E W), 11g  
 Stark Co.: Green (H A), 70  
 State geological survey: Salisbury, 06c  
 necessity for: Bement, 05  
 work of: Bain, 07b; DeWolf, 09a  
 Stephenson Co.: Shaw (J), 73  
 Tazewell Co.: Bannister, 70  
 Tree, fossil, Desplaines River: Schoolcraft,  
 22a, b  
 Union Co.: Worthen, 68a  
 Vermilion Co.: Bradley, 70  
 Wabash Co.: Worthen, 75a  
 Warren Co.: Green (H A), 70  
 Washington Co.: Engelmann (H), 68  
 Wayne Co.: Worthen, 75a  
 White Co.: Worthen, 75a  
 Whiteside Co.: Shaw (J), 73  
 Will Co.: Bradley, 70  
 Williamson Co.: Worthen, 75a  
 Winnebago Co.: Shaw (J), 73  
 Woodford Co.: Green (H A), 70  
*Economic geology.*  
 Belleville and Breese quadrangles: Udden, 15  
 Bond, Macoupin, and Montgomery cos.: Blatch-  
 ley (R S), 14  
 Building stone: Hawes, 84; Udden, 10b  
 Cement materials: Bleininger, 12; Eckel, 13  
 Chicago district: Burchard, 08a  
 LaSalle: Cady, 08  
 Chicago district: Alden, 02  
 Clay: Purdy, 07; Udden (Jon A), 10b  
 geology of: Rolfe, 08  
 Murphysboro and Herrin quadrangles:  
 Shaw (E W), 12b  
 Murphysboro quadrangle: Shaw (E W), 11a  
 Union Co., Mountain Glen: St. Clair, 17c  
 Coal: Andros, 15; Ashley, 02; Bain, 06a, 07f,  
 08e; Bement, 06, 10, 13; Comstock, 87b;  
 DeWolf, 08, 08b, 09, 10a; Foster, 56;  
 Fuller, 03c; Lesquereux, 66; Norwood, 57;  
 Parr, 06, 06a, 07, 10; Shepard, 40b; Steek,  
 10; Worthen, 83, 90a; Young (C M), 17;  
 Young (L E), 16  
 accumulation of vegetable matter: Savage, 14  
 analyses: Parr, 07, 10  
 Belleville-Breese area: Udden, 08d, 15  
 cannel coal in northern Ill.: Grout, 07a  
 Centralia: Engelmann (H), 75  
 Colchester and Macomb quadrangles: Hinds,  
 17b  
 Danville quadrangle: Campbell (M R), 00  
 District I: Cady, 15  
 District VI: Cady, 16  
 District VII: Kay (F H), 15  
 District VIII (Danville): Kay, 15a  
 Duquoin: Udden (Jon A), 09  
 Franklin and Williamson cos.: DeWolf, 11



## Illinois—Continued.

*Economic geology—Continued.*

Coal: Gillespie and Mount Olive quadrangles:  
Lee (W), 17

Herrin quadrangle: Savage, 10, 11, 11a

Jackson Co.: Cady, 17

Kingston, Peoria Co.: Richardson (C S), 55

Massac Co.: Shaw (E W), 17c

Murphysboro quadrangle: Shaw (E W), 10a,  
11f

Patoka quadrangle: Fuller, 04

Peoria: Udden, 08b, 12

Randolph and St. Clair cos.: Worthen, 66a

St. Louis quadrangle: Fenneman, 11

Saline-Gallatin field: DeWolf, 07

Saline and Williamson cos.: DeWolf, 08a

Springfield quadrangle: Savage, 15; Shaw  
(E W), 13a

Tallula quadrangle: Shaw (E W), 13a

West Frankfort quadrangle: Cady, 10

Wilmington field: Johnson(J), 75

Colchester-Macomb quadrangles: Hinds, 17a, b

Concrete materials, Chicago district: Burchard,  
08a

Fire clays: Purdy, 07; Lines, 17

Fluorite, optical, southern Ill.: Pogue, 18

Fluorspar: Bain, 04e; Harwood, 03

Gallatin Co.: Brush, 52

Rosiclare: Burchard, 11d

southern Ill.: Bain, 04d, f, 05b; Burk, 01;  
Emmons (S F), 93c

Franklin and Williamson cos.: DeWolf, 11

Galena-Elizabeth quadrangles: Shaw (E W), 16

General: Mead (D W), 94b

Glass sand: Burchard, 06a

Gold, Stephenson Co.: Hershey, 99d

Greenville gas field: Blatchley (R S), 14

Hardin Co.: Worthen, 66b

Herrin quadrangle: Savage, 10, 11, 11a; Shaw  
(E W), 12b

La Salle and Hennepin quadrangles: Cady, 17a

La Salle Co.: Baldwin, 77; Worthen, 83

Lead: Bain, 04c, 05a, 06; Davis (R E), 06; Whit-  
ney, 66c

Dubuque and Galena: Jackson, 63a

Rosiclare, Hardin Co.: Norwood, 66; Wor-  
then, 66b

northwestern Ill.: Shaw (J), 73

Lead and zinc deposits: Bain, 06; Cox (G H),  
11; Davis (R E), 06

Elizabeth and Galena quadrangles: Trow-  
bridge, 16

Elizabeth district: Cox (G H), 10

Lancaster and Mineral Point quadrangles:  
Grant (U S), 07

Millbrig sheet: Grant, 08

northwestern Ill.: Cox (G H), 10, 14

Limestones: Van Horn (F B), 07

analyses: Blaney, 68

Chicago district: Burchard, 08a

Sangamon Co.: Crook, 12a

Mineral production, 1909-10: Cady, 15a

Mineral resources: Skewes, 17

Murphysboro quadrangle: Shaw (E W), 10a,  
11b, 12b

## Illinois—Continued.

*Economic geology—Continued.*

Natural gas: Blatchley (R S), 10; Comstock, 87c,  
89a; Freeman (H C), 87; Worthen, 90a

Bond, Macoupin, and Montgomery cos.:  
Blatchley (R S), 14

Champaign Co.: Baker (I O), 85; in glacial  
drift: Knirk, 09

Gillespie and Mt. Olive quadrangles: Lee (W),  
15

Greenville field: Blatchley (R S), 14

Pike Co.: Savage, 06c

southeastern Ill.: Blatchley (W S), 06

Sparta: Nickles, 95a

Northwestern Ill.: Owen (D D), 40

Oil, black shales: Ashley, 17

Oil and gas conditions: Wheeler (H A), 10

Oil and gas fields: Wheeler (H A), 18

Birds quadrangle: Rich, 16

Colchester and Macomb quadrangles: Hinds,  
14

eastern Ill.: Bain, 08

St. Louis district: Wheeler (H A), 09

Oil investigations, Saline, Johnson, Pope, and  
Williamson cos.: Brokaw, 17; William-  
son, Union, and Jackson cos.: St. Clair, 17

Oil possibilities, Ava area: St. Clair, 17a

Centralia area: St. Clair, 17b

Hardin, Pope, and Saline cos.: Butts, 17a

Oil resources: Blatchley (R S), 10

Patoka quadrangle: Fuller, 04

Paving brick material: Rolfe, 08a

Peoria quadrangle: Udden, 12

Portland-cement resources: Bleininger, 12

Petroleum: Bain, 06f, 07c, 08a, c, 09; Blatchley  
(R S), 09, 10, 11, 12, 12a, b; Blatchley (W  
S), 06; Comstock, 89a, Kay (F H), 16, 17,  
17a; Wheeler (H A), 09, 11a, 12, 14; Wor-  
then, 90a

Allendale field: Rich, 15

Bond, Macoupin, and Montgomery cos.:  
Blatchley (R S), 14

Carlinville: Kay (F H), 12

Carlyle: Shaw (E W), 12; Wheeler, 11

Chicago: Hunt, 71e; Shufeldt, 65

Colmar field: Morse, 15a

Crawford and Lawrence cos.: Blatchley (R  
S), 12, 13

eastern: Bain, 08f; Blatchley (R S), 09

Gillespie and Mt. Olive quadrangles: Lee (W),  
15

in 1916: Kay (F H), 17a

Litchfield field: Blatchley (R S), 14

Plymouth field: Blatchley (R S), 14, 17

Randolph Co.: Grout, 06

southeastern Ill.: Blatchley (W S), 06

St. Louis quadrangle: Fenneman, 11

Saline and Williamson cos.: DeWolf, 08a

Sand: Udden (Jon A), 10b; Chicago district:  
Burchard, 08a

Sand-lime brick: Parr, 12

Silica deposits: Bain, 07e; southern Ill.: Hol-  
brook, 17

Springfield quadrangle: Savage, 15

Stone, Chicago district: Alden, 03

Structural materials: Udden (Jon A), 10b

West Frankfort quadrangle: Cady, 10



## Illinois—Continued.

*Economic geology*—Continued.

Zinc: Bain, 04c, 05a, 06; Davis (R E), 06  
 Millbrig sheet: Grant, 08  
 northern Ill.: Cox (G H), 10

*Historical geology*.

Adams Co.: Worthen, 70  
 Alexander Co.: Worthen, 68a  
 Alexandrian series: Savage, 13, 13a, 14a; north-eastern Illinois: Savage, 15a, 16a  
 Allendale oil field, Wabash Co.: Rich, 15  
 Ava area: St. Clair, 17a  
 Belleville-Breese area: Udden, 08d, 15  
 Birds quadrangle: Rich, 16  
 Bond Co.: Broadhead, 75  
 Bond, Macoupin, and Montgomery cos.: Blatchley (R S), 14  
 Boone Co.: Shaw (J), 73  
 Borings: Cady, 15; Kay (F H), 15; Savage, 13c; Udden, 14  
 Dixon: Tiffany, 90  
 La Salle: Cady, 12  
 Moline: Pratt (W H), 82b  
 Plymouth oil field: Blatchley (R S), 17  
 Rock Island: Udden, 98b  
 Saybrook: Anon, 88c  
 Bremen anticline, Randolph Co.: Kay (F H), 16a  
 Brown Co.: Worthen, 70  
 Bureau Co.: Shaw (J), 73  
 Calhoun Co.: Weller, 07b; Worthen, 70  
 Canton and Avon quadrangles, geologic structure: Savage, 16  
 Cap au Gres: Keyes, 98n; fault: Keyes, 17j  
 Carboniferous: Blatchley (R S), 11; Worthen, 68  
 Massac Co.: Shaw (E W), 17c  
 Mississippian: Hall, 57d  
 Carlyle oil field: Shaw (E W), 12  
 Carroll Co.: Shaw (J), 73  
 Cass Co.: Bannister, 70  
 Centralia area: St. Clair, 17b  
 Champaign Co.: Bradley, 70  
 Channahon and Essex limestones: Savage, 12  
 Chester group: Weller (S), 13  
 Chester sandstone: Nickles, 91  
 Chester series: Ulrich, 17  
 Chicago district: Alden, 02; Stone (L), 86  
 Chicago drainage canal: Lewis (J F), 98  
 Christian Co.: Broadhead, 75  
 Cincinnati group, Stephenson Co.: Hershey, 93a  
 Clark Co.: Worthen, 75a  
 Clay Co.: Worthen, 75a  
 Clinton Co.: Engelmann (H), 68  
 Coal beds correlation: White (D), 09  
 Coal fields: Lesquereux, 66; White (D), 07a, d  
 Coal measures: Stevens, 58a; Worthen, 68b, 75  
 Colchester and Macomb quadrangles: Hinds, 14, 17a, b  
 Coles Co.: Worthen, 75a; Colmar oil field: Morse, 15a; area south of: Morse, 15  
 Columbia formations, northwestern Ill.: Hershey, 95  
 Cook Co.: Bannister, 68  
 Crawford Co.: Blatchley (R S), 13; Worthen, 75a  
 Cumberland Co.: Worthen, 75a

## Illinois—Continued.

*Historical geology*—Continued.

Danville district: Kay, 15a; Wegemann, 09  
 Danville quadrangle: Campbell (M R), 00  
 DeKalb Co.: Bannister, 70  
 Delafield drill core: Udden (Jon A), 07  
 Devonian, Rock Island region: Ekblaw, 12; Udden, 97b  
 southern Ill.: Weller, 97a  
 Devonian deposit in Niagaran: Weller, 99a  
 District VI: Cady, 16  
 Douglas Co.: Worthen, 75a  
 Du Page Co.: Bannister, 70  
 East St. Louis area: Bowman (I), 07; Fenneman, 07a  
 Edgar Co.: Bradley, 70  
 Edwards Co.: Worthen, 75a  
 Effingham Co.: Broadhead, 75  
 Elizabeth quadrangle: Trowbridge, 16  
 Elizabeth lead and zinc district: Cox (G H), 10  
 Evanston-Waukegan region: Atwood, 08a  
 Fayette Co.: Broadhead, 75  
 Florencia formation: Hershey, 97c; Pilsbry, 98  
 Ford Co.: Bradley, 70  
 Franklin Co.: Worthen, 75a; boring: Udden (Jon A), 10  
 Franklin and Williamson cos.: DeWolf, 11  
 Fulton Co.: Worthen, 70  
 Galena quadrangle: Trowbridge, 16  
 Galena series: Sardeson, 07  
 Galena-Elizabeth quadrangles: Shaw (E W), 16  
 Gallatin Co.: Cox (E T), 75a  
 General: Hall, 43c; Leverett, 05; Owen (D D), 46; Rolfe, 03; Worthen, 66  
 Geologic map: Ill G S 12; Irving, 06; Mead, 94b; Weller, 06a; Worthen, 75b, 90c; formations of: Weller, 08  
 Geologic structure: Weller, 06b  
 Gillespie and Mt. Olive quadrangles: Lee (W), 15  
 Girardeau and Edgewood formations: Savage, 10b  
 Grand Tower (Onondaga) formation: Savage, 10c  
 Greene Co.: Worthen, 68a  
 Grundy Co.: Bradley, 70  
 Gulf embayment area: Glenn, 06c  
 Hamburg, sections: Weller, 06  
 Hamilton Co.: Worthen, 75a  
 Hancock Co.: Worthen, 66a  
 Hardin Co.: Worthen, 66b  
 Hardin, Pope, and Saline cos.: Butts, 17a  
 Henderson Co.: Green (H A), 70  
 Henry Co.: Shaw (J), 73  
 Herrin quadrangle: Savage, 10, 11, 11a; Shaw (E W), 12b  
 Illinois Valley: Sauer, 16  
 Iroquois Co.: Bradley, 70  
 Jackson Co.: Cady, 17, St. Clair, 17; Worthen, 68a  
 Jasper Co.: Worthen, 75a  
 Jefferson Co.: Engelmann (H), 68  
 Jersey Co.: Worthen, 68a  
 Jo Daviess Co.: Shaw (J), 73  
 Johnson Co.: Engelmann (H), 68  
 Kane Co.: Bannister, 70  
 Kankakee Co.: Bradley, 70



## Illinois—Continued.

*Historical geology—Continued.*

- Kendall Co.: Bannister, 70  
 Kinderhook group, western Ill.: Moore (R C), 17a  
 Knox Co.: Green (H A), 70  
 Lake Co.: Bannister, 70  
 La Salle and Hennepin quadrangles: Cady, 17a  
 La Salle Co.: Calkins, 77; Freeman (H C), 68; Norwood, 58; Worthen, 83  
 Lawrence Co.: Blatchley (R S), 13; Worthen, 75a  
 Lead region: James (E), 27; Whitney, 66c  
 Leclaire limestone: Worthen, 62  
 Lee Co.: Shaw (J), 73  
 Livingston Co.: Freeman (H C), 75  
 Logan Co.: Bannister, 70  
 McDonough Co.: Worthen, 73a  
 McHenry Co.: Bannister, 70  
 McLean Co.: Bannister, 70  
 Macon Co.: Broadhead, 75  
 Macoupin Co.: Worthen, 73a  
 Madison Co.: Worthen, 66a  
 Marion Co.: Engelmann (H), 68  
 Marl deposits, central Ill.: Baker (F C), 18  
 Marshall Co.: Shaw (J), 73  
 Mason Co.: Bannister, 70  
 Mazon Creek shales: Moodie, 12b  
 Menard Co.: Bannister, 70  
 Mississippi Valley, Savanna-Davenport: Carman, 09  
 Mississippian, southern Ill.: Engelmann (H), 63a  
 Mississippian section: Weller, 08b  
 Monroe Co.: Worthen, 73a  
 Montgomery Co.: Broadhead, 75  
 Morgan Co.: Bannister, 70  
 Moultrie Co.: Broadhead, 75  
 Murphysboro quadrangle: Shaw (E W), 10a, 11f, 12b  
 New Richmond sandstone, northern Ill.: Cady, 17c  
 Niagaran, Chicago: Winchell (A), 66a  
 Nomenclature of formations: Meek, 66  
 Northern Ill.: Shepard, 38  
 Northwestern Ill.: Cox (G H), 14; Owen (D D), 40; Shaw (J), 73  
 Ogle Co.: Shaw (J), 73  
 Orange sands, age: Salisbury, 91  
 Orchard Creek shale: Savage, 18b  
 Ordovician and Silurian formations in Alexander Co.: Savage, 09  
 Paleogeography of St. Peter time: Berkey, 06  
 Paleozoic of southwestern Ill.: Savage, 08  
 Parallelism of eastern and western Interior coal fields: Keyes, 17g  
 Patoka quadrangle: Fuller, 04  
 Pecatonica limestone: Hershey, 97a  
 Peoria: Udden, 08c; defects in coal no. 5: Udden, 08b  
 Peoria Co.: Worthen, 73a  
 Peoria quadrangle: Udden, 12  
 Perry Co.: Worthen, 68a  
 Pike Co.: Worthen, 70  
 Platt Co.: Broadhead, 75  
 Pope Co.: Engelmann (H), 66  
 Pre-Devonian formations of southern Ill.: Savage, 10a

## Illinois—Continued.

*Historical geology—Continued.*

- Preglacial soils: Udden, 98c  
 Pre-Richmond unconformity in Mississippi Valley: Weller, 07b  
 Pulaski Co.: Engelmann (H), 66  
 Putnam Co.: Shaw (J), 73  
 Quaternary: Broadhead, 71; Worthen, 85  
 Randolph Co.: Worthen, 66a  
 Richland Co.: Worthen, 75a  
 Rock Island: Udden, 96  
 Rock Island Co.: Tiffany, 85; Worthen, 73  
 Rock River valley: Everett, 61  
 Sabine, Williamson, Pope, and Johnson cos.: Brokaw, 16  
 St. Clair Co.: Worthen, 66a  
 Ste. Genevieve limestone, Monroe Co.: Weller, 16a  
 St. Louis limestone: Engelmann (H), 47  
 St. Louis quadrangle: Fenneman, 11  
 St. Peter sandstone, Elk Horn Creek: Hershey, 94  
 Salem limestone: Weller, 08a  
 Saline and Williamson cos.: DeWolf, 08a  
 Saline Co.: Cox (E T), 75a  
 Saline, Johnson, Pope, and Williamson cos.: Brokaw, 17  
 Saline-Gallatin field: DeWolf, 07  
 Sangamon Co.: Crook, 12, 12a; Worthen, 73a  
 Schuyler Co.: Worthen, 70  
 Scott Co.: Worthen, 68a  
 Section, across northern Ill.: Udden, 95  
     Rock Island-Joliet: Cady, 12  
     St. Louis-Shawneetown: Nickles, 95  
     southern Ill.: Nickles, 95a  
 Shelby Co.: Broadhead, 75  
 Shoal Creek limestone: Udden (Jon A), 08  
 Silurian: Daniels, 58c; Worthen, 71  
 Silveria formation, Stephenson Co.: Hershey, 96c  
 Southern Ill.: Bain, 05b; Shaw (E W), 17c  
 Springfield quadrangle: Savage, 15; Shaw (E W), 13a  
 Stark Co.: Green (H A), 70  
 Starved Rock State Park: Cady, 18  
 Stephenson Co.: Shaw (J), 73  
 Sweetland Creek shale: Udden, 12a  
 Tallula quadrangle: Shaw (E W), 13a  
 Tazewell Co.: Bannister, 70  
 Tertiary: Heilprin, 84a  
 Thebes sandstone: Savage, 18b  
 Union Co.: St. Clair, 17; Worthen, 68a  
 Vermilion Co.: Bradley, 70  
 Vincennes quadrangle: Rich, 16a  
 Wabash Co.: Worthen, 75a  
 Warren Co.: Green (H A), 70  
 Washington Co.: Engelmann (H), 68  
 Wayne Co.: Worthen, 75a  
 West Frankfort quadrangle: Cady, 10  
 Wheaton, rock bed near: Trowbridge, 08  
 Wheaton quadrangle: Trowbridge, 12  
 White Co.: Worthen, 75a  
 Whiteside Co.: Shaw (J), 73  
 Will Co.: Bradley, 70  
 Williamson Co.: St. Clair, 17; Worthen, 75a  
 Winnebago Co.: Shaw (J), 73  
 Woodford Co.: Green (H A), 70



## Illinois—Continued.

*Mineralogy.*

- Barite, Hanover: Shipton, 15  
 Cerusite: Hobbs, 92c  
 Chicago area: Crook, 01, 02  
 Fluorite, optical, southern Ill.: Pogue, 18  
 Galena limestone minerals: Hobbs, 95b  
 Geodes, Keokuk limestone: Brush, 66a; Perkins (G H), 71; Van Tuyl, 16f

*Paleontology.*

- Acanthotelson stimpsoni, Mazon Creek: Cockerell, 16b  
 Alexandrian rocks, northeastern Ill.: Savage, 16a  
 Alexandrian series fauna: Savage, 13a  
 Amphibamus, Mazon Creek: Cope, 65, 66  
 Amphibia, Mazon Creek: Moodie, 10a, 11b, 13a, 16  
 Aphelichthys, Pulaski Co.: Cope, 93b  
 Arthropods, Carboniferous: Melander, 03; Devonian: Savage, 13b  
 Articulata: Scudder, 68  
 Atactocrinus, Richmond: Weller, 16  
 Beetles, Sangamon peat: Wickham, 17  
 Bellinurus, Coal Measures: Meek, 67b  
 Blastoidea: Meek, 69b  
 Bryozoa, Carboniferous: Prout, 66a  
 Carboniferous: Hall, 64c; Meek, 60d, f, 61b, 69c; White (C A), 78e  
   arthropods: Melander, 03; Packard (A S), 89  
   Crinoidea: Wachsmuth, 82, 83; Worthen, 82  
   Echinodermata: Worthen, 83c  
   ferns, Mazon Creek: Sellards, 02  
   fishes: Eastman, 03a  
   Invertebrata: Gurley (W F E), 84; Stevens (R P), 58  
   sharks: Eastman, 02  
   Spongida: Ulrich, 90a  
 Castoroides, Charleston: Leidy, 67b; Shawneetown: Le Conte (J L), 52b  
 Cincinnati Bryozoa: Ulrich, 90e  
 Cleidophorus, Niagaran: Miller (S A), 81a  
 Coal Measures: Meek, 71f; Stevens, 58a  
   Mazon Creek: Meek, 68a; Amphibia: Moodie, 16; Coackroaches: Scudder, 82e, 85g, 90c  
 Coelosteus, Mississippian: Newberry, 87d  
 Conularia: Calvin, 90; Galena: Conrad, 54b  
 Crinoidea: Meek, 65g  
   Carboniferous: Meek, 65h  
   Chicago area: Slocum, 07a; Weller, 00c  
   Louisville area: Lyon, 69  
   Mississippian: Meek, 68e; Miller (S A), 96a, b; Owen (D D), 52c  
   Niagaran: Miller (S A), 94  
 Crotalocrinus: Weller, 02a  
 Devonian faunas, southern Ill.: Weller, 97a  
 Dicotyles: Le Conte (J L), 52  
 Dipeltis, Morris: Schuchert, 97a  
 Diplodus, Devonian: Eastman, 99b  
 Dipnoan fish scale from Mazon Creek: Cockerell, 11c  
 Drift fossils, Alton: McAdams, 83a, 84  
 Echinodermata, Mississippian: Hambach, 84a; Meek, 69a  
 Edestus, Mason Co.: Newberry, 88g  
 Elizabeth quadrangle: Trowbridge, 16  
 Endoceras, Bristol: Miller (S A), 82b

## Illinois—Continued.

*Paleontology—Continued.*

- Eucalyptocrinus, Niagaran, Illinois: Miller (S A), 80e  
 Euproops: Meek, 67c  
 Fern Glen fauna: Weller, 09, 09c  
 Foraminifera, Carboniferous: Bagg, 09a  
 Galena quadrangle: Trowbridge, 16  
 Idiophyllum (=Neuropteris), Mazon Creek: Sellards, 02a  
 Insecta, Mazon Creek: Cockerell, 16, 17b; Dana (J D), 64a; Handlirsch, 11; Scudder, 65b, 68c  
 Invertebrata: Meek, 65j, 68d, 70b; Worthen, 90b; Carboniferous: Meek, 66a, 73a; Worthen, 83a, 84  
 Kinderhook fauna, Hamburg: Weller, 06  
 Land snails, Coal Measures, Vermilion Co.: Bradley, 72  
 Lasalle Co.: Calkins, 77  
 Mammalia: Le Conte (J L), 48a  
   Galena: Leidy, 62  
   Jo Daviess Co.: Leidy, 70e  
 Mastodon: Warren (J C), 54a  
   Aurora: Wilber, 61  
   distribution: Bagg, 09  
   Illioplis: Anon, 70  
 Mastodon and mammoth, distribution: Anderson (N C), 05  
 Mazon Creek: Meek, 65e, 68a; Pike, 81  
   Amphibia: Moodie, 10a, 11b, 13c, 16  
   Arthropoda and Vermes: Fritsch, 07  
   fish: Eastman, 02a  
   Insecta: Scudder, 68, 82e, 85g, 90c  
   mode of preservation of fossils: Pike, 80  
   Plantae: Peola, 08  
 Medusae, Niagaran: Weller, 97b  
 Megalomus canadensis, Leclaire beds, Port Byron: Norton, 95c  
 Microscopic organisms in boulder clay, Chicago: Johnson (H A), 84  
 Mississippian boulders, Chicago: Davis (W W), 17  
 Mississippian Brachiopoda: Weller (S), 14  
 Mississippian Echinodermata: Meek, 69a  
 Mollusca, Carboniferous: Worthen, 83b  
 Niagaran: Miller (S A), 80a, d, 81c, d, 82e  
   Chicago: Winchell (A), 66a  
   Crinoidea: Miller (S A), 82b, 94  
   Subulites: Miller (S A), 82d  
 Northern Ill.: Shepard, 38  
 Orchard Creek shale: Savage, 18b  
 Ordovician Spongida: Ulrich, 90b  
 Orthoceras, Galena: Verneuil, 47  
 Ostracoda: Ulrich, 90f  
 Palaeacis, Illinois: Nicholson, 78c  
 Palaeocampa, Mazon Creek: Scudder, 82b  
 Paleozoic Bryozoa: Ulrich, 90c  
 Paleozoic Invertebrata: McChesney, 67; Meek; 66c, 68, 75b; Miller (S A), 93, 96c  
 Pelecypoda, Coal Measures: Worthen, 82a; Pleistocene, Chicago area: Baker, 98  
 Permian fishes: Hussakof, 11a  
 Permian Vertebrata: Cope, 78g, 83l  
 Petalodus, Carboniferous: Hay (O P), 95



**Illinois—Continued.***Paleontology—Continued.*

Pisces: Cope, 75x; Eastman, 99b, 02a; Leidy, 57f; Newberry, 66, 68a, 70b; St. John, 75, 83; Worthen, 57, 66c

St. Louis limestone, Alton: McAdams, 83b

Plantae, Carboniferous: Lesquereux, 66a, 70; terrestrial, Mississippian: Worthen, 60b

Platygonus compressus: Le Conte (J L), 48

Pleistocene mollusks: Baker (F C), 15

Postglacial Mollusca, central Ill.: Baker (F C) 18

Proboscidea, Pleistocene, occurrence: Udden, 05

Puma, Kaskaskia River: Leidy, 88

Pyrgulopsis scalariformis, Rock Island: Shimek, 92

Reptilia: Cope, 75x

Rhachura, Danville: Scudder, 78e

Rhizodus, St. Louis limestone, Alton: Newberry, 88j

Rock Island Co.: Tiffany, 85

Ste. Genevieve fauna, Monroe Co.: Weller, 16a

Silurian fossils: Foerste, 09b

Spider, Mazon Creek: Harger, 74

Spirorbis, Mazon Creek: Dawson (J W), 81e

Termes, Vermilion Co.: Scudder, 78f

Thebes sandstone: Savage, 18b

Trilobites, Niagaran, Chicago area: Weller, 07a

Trees, postglacial: Penhallow, 92

Trenton fossils: Walcott 79b

Vermilion Co., Permian: Case, 00

Vertebrata: Cope, 75zc, 78d, 97

Xiphosura, Carboniferous: Packard (A S), 85

*Physical geology.*

Accumulation of coal beds: Savage, 14

Bremen anticline, Randolph Co.: Kay (F H), 16a

Canton and Avon quadrangles, geologic structure: Savage, 16

Chestnut Ridge disturbance: Gardner (J H), 15

Clay seams near Springfield: Savage, 09a

Colmar oil field, structure: Morse, 16a

Deformation, Quaternary, southern Ill.: Shaw (E W), 15d

Earthquake, January 2, 1912: Udden (A D), 12

Elizabeth quadrangle: Trowbridge, 16

Fluvial deposits, Peoria Lake: Wilson (J D), 83

Fracture systems: Hobbs, 05

Galena quadrangle: Trowbridge, 16

Glacial erosion: Rich, 15c

Illinois Valley: Sauer, 16

Randolph Co., anticline: Weller, 15

Subsidence from coal mining: Young (L E), 16

Till, formation of: Hershey, 97d

Tufa, Danville: Decker, 12

*Physiographic geology.*

Abandoned beaches, south end of Lake Michigan: Wright (G F), 17a, 18

Belleville and Breese quadrangles: Udden, 15

Camp Grant environment: Salisbury, 18

Camp Grant quadrangle: U S G S, 18

Canton quadrangle, loess and drift, relations: Savage, 17

Chicago district: Alden, 02; Leverett, 97b; Salisbury, 99a; Jackson Park: Willard, 93; Pleistocene: Leverett, 97b

**Illinois—Continued.***Physiographic geology—Continued.*

Danville region: Wegemann, 09

Des Plaines Valley: Goldthwait, 09

Discrimination of drift sheets: Alden, 09

Drainage about Springfield: Jones (J C), 08

Drainage changes, western Ill.: Leverett, 92c

Drift, older: Leverett, 93d

Drift deposits: Andrews (E), 69; Bliss, 65; Claypole, 82; Leverett, 95; McAdams, 84;

Worthen, 90; Chicago: Andrews (E), 67

Driftless area, Calhoun Co.: Salisbury, 91b

Elizabeth quadrangle: Shaw (E W), 16; Trowbridge, 16

Embarrass Valley: Hubbard (G D), 04

Erosion cycles, preglacial, northwestern Ill.: Hershey, 96b

Eskers, Kansan epoch: Hershey, 97; superglacial: Upham, 94n

Evanston-Waukegan region: Atwood 08a

Extinct lakes: Shaw (E W), 15

Forest bed: Leverett, 89b

Galena quadrangle: Shaw (E W), 16; Trowbridge, 16

General: Hubbard (G D), 04a

Glacial boulders: Hubbard (G D), 11

Glacial drift sheets: Alden, 09

Glaciation: McAdams, 83; McGee, 79b; Chicago area: Guthrie, 96

Grand Tower: Marbut, 98a

Illinois glacial lobe: Leverett, 99

Illinois Valley: Barrows, 08, 10; Cady, 17b; Sauer, 16

Jo Daviess Co., partly dissected plains: Trowbridge, 13

Kankakee Valley: Montgomery (H T), 99

Lake beds of prairie region: Wallace (S J), 69

Lake Michigan glacier: Guthrie, 90

Loess, origin and age: Savage, 16c; western Ill.: Leverett, 96c

Loess and drift: Holmes (N), 68

Mississippi Valley, Savanna-Davenport: Carman, 09

Monks Mound, St. Clair Co.: Crook, 15, 17

Moraines, northeastern Ill.: Leverett, 89c

Murphysboro and Herrin quadrangles: Shaw, (E W), 12b

Peorian soil: Leverett, 98c

Pleistocene, northern Ill.: Hershey, 96a

Pleistocene rock gorges, northwestern Ill.: Hershey, 93

Preglacial valleys: Clem, 11

Quaternary lakes: Shaw (E W), 11c

Rock River basin, drainage changes: Leverett, 93c

St. Louis area: Fenneman, 09

Sangamon: Leverett, 98

Southern Ill.: Bonnell, 17; Shaw (E W), 11a, 15d, 17c; extinct lakes: Shaw (E W), 15

Springfield quadrangle: Shaw (E W), 13a

Striae and slickensides at Alton: Todd, 91

Superficial deposits along the Mississippi: Fowkes, 06, 08

Tallula quadrangle: Shaw (E W), 13a

Till, character in southern Ill.: Shaw (E W), 18f

Two pre-morainic glacial movements, Rock River valley: Swezey, 93



## Illinois—Continued.

*Physiographic geology*—Continued.

Vegetable remains in drift: Winchell (N H), 76b  
 Wilmette Bay, Glacial Lake Chicago: Baker (F C), 12

Yarmouth weathered zone: Leverett, 98a

*Underground water.*

Artesian water from drift: Rolfe, 90  
 Artesian wells at Peoria: Udden, 08c  
 Chicago area: Anderson (C B), 15; Stone (L), 86  
 East St. Louis district: Bowman, 07  
 General: Mead (D W), 93  
 Geological classification of the waters of Illinois: Udden, 09  
 Gulf embayment area: Glenn, 06c  
 Illinois Valley: Barrows, 08  
 Mineral content of Illinois waters: Bartow, 09  
 Mineral springs: Palmer (G T), 09  
 Peoria quadrangle: Udden, 12  
 Springfield quadrangle: Savage, 07  
 Water resources: Leverett, 96, 99, 05

Illinois glacial lobe: Leverett, 99

Ilvaite, Shasta Co., Cal.: Prescott, 08

Imbricate structure: Hobbs, 94b

## Incerta sedes.

Beatricea, Ky.: Shaler, 77h  
 Receptaculites: Hall, 63d  
 Scolithus, Chazy formation, Ottawa: Ami, 87  
 Scolithus casts: Wanner, 90  
 Solenopora: Brown (A), 94  
 Steeprock fauna, Ontario: Walcott, 12a  
 Stromatocerium: Seely, 94

Inclusions in dikes, origin: Powers, 15

Independence folio, Kans. (no. 159): Schrader, 08

Index district, Wash.: Weaver, 12

Index fossils: Grabau, 06a, 09f

## Indiana.

Bibliography: Marsters, 94  
 Boulder, Montgomery Co.: McBeth, 00a  
 Carroll Co.: Collett, 72b  
 Cass Co.: Collett, 72b  
 Clay Co.: Cox (E T), 69  
 Dearborn Co.: Bigney, 16; Warder, 72  
 Driftless Area, geology: Cumings, 12a  
 Franklin Co.: Haymond, 69  
 General: Barrett, 12a, 18; Brown (R T), 54; Stilson, 18  
 Geologic history: Blatchley (W S), 04, 17  
 Glaciation and soils: Barrett, 12  
 Greene Co.: Cox (E T), 69; Van Gorder, 16  
 Howard Co.: Collett, 72b  
 Jasper Co.: Collett, 72b  
 Jefferson Co.: Culbertson, 16  
 Jug Rock: Dryer, 99  
 Miami Co.: Collett, 72b  
 Ohio Co.: Warder, 72  
 Silica in Bedford limestone: Knight (N), 05  
 Soils: Barrett, 12a; Shannon, 08  
   analyses: Peter (R), 62  
 Benton Co.: Jones (G B), 17  
 Carroll Co.: Erni, 17  
 Clay, Knox, Sullivan, and Vigo cos.: Shannon, 12  
 Clinton Co.: Tharp, 15  
 Daviess Co.: Snider, 09  
 Dubois, Perry, and Crawford cos.: Shannon,

## Indiana—Continued.

Soils: Elkhart Co.: Jones (G B), 15

Fountain Co.: Orahood, 16

Grant Co.: Hurst, 16

Hancock, Johnson, and Shelby cos.: Hole, 12b

Howard Co.: Coryell, 15

Jay Co.: Hole, 15

Morgan and Owen cos.: Edmonson, 12

Starke Co.: Grimes, 16

Warren Co.: Grimes, 15

Wells Co.: Tharp, 16

White Co.: Bushnell, 16

Whitley Co.: Shiltz, 17

Surveys: Owen (D D), 38, 61a; reports: Barrett, 12, 18; Collett, 83, 84, 84b; Gorby, 92, 94a;

Switzerland Co.: Warder, 72

Vermilion Co.: Bradley, 69

Wabash Co.: Collett, 72b

Water powers: Tucker, 11

White Co.: Collett, 72b

Whitley Co.: Shiltz, 17

*Economic geology.*

Asphalt, southwestern Ind.: Fuller, 03d

Bedford oolitic limestone: Hopkins (T C), 97a, c; Siebenthal: 98, 99

Black slate, New Albany: Duden, 97

Bloomington quadrangle: Beede, 15

Building stone: Cox (E T), 79; Hawes, 84; Thompson (M), 86, 92; Bedford and Bloomington stone: Udden (Jon A), 10a

Cement materials: Cox (E T), 79; Eckel, 13

Clay: Blatchley (W S), 96a, 05; Thompson (M), 86; northwestern Ind.: Blatchley (W S), 98b

Clay Co.: Collett, 76a

Coal: Ashley, 99, 00, 02, 05d, 09, 09a; Brown (R T), 54; Collett, 84; Cox (E T), 71a, 72, 74a, 76; Foster, 71; Fuller, 03c; Lesquereux, 62; Noyes, 97

Cannelton field, Perry Co.: Lesley (J), 62

Clay Co.: Collett, 76a; Cox (E T), 69

Ditney Quadrangle: Fuller, 02

Dubois Co.: Collett, 72

Gibson Co.: Collett, 74c

Knox Co.: Collett, 74b

Owen Co.: Collett, 76

Parke Co.: Hobbs (B C), 72

Parke, Fountain, Warren, Owen, and Vermilion cos.: Cox (E T), 69

Patoka quadrangle: Fuller, 04

Pike Co.: Collett, 72a

Putnam Co.: Collett, 76b

southwestern Ind.: Cox (E T), 71

Sullivan Co.: Collett, 71

Vanderburgh Co.: Collett, 76

Vigo Co.: Cox (E T), 76; Scovell, 97

Warren Co.: Collett, 74

Daviess Co.: Cox (E T), 71

Diamonds: Blatchley (W S), 03a

Ditney quadrangle: Fuller, 02

Dubois Co.: Collett, 72

Franklin Co.: Haymond, 69

General: Blatchley, 97; Brown (R T), 54; Collett, 82, 83, 84; Cox (E T), 74, 74a, 75, 79; Gorby, 94; Owen (D D), 38, 39, 59, 62; Thompson (W H), 89a

Gibson Co.: Collett, 74c



**Indiana—Continued.***Economic geology—Continued.*

Glass sands: Barrett, 14a; Burchard, 071  
 Gold: Blatchley (W S), 03a  
 Gold-bearing drift: Sutton, 82  
 Greene Co.: Van Gorder, 16  
 Harrison Co.: Collett, 79  
 Iron ores: Beede, 07a; Shannon, 07a; Martin Co.: Beede, 07a  
 Knox Co.: Collett, 74b  
 Lawrence Co.: Collett, 74a  
 Lime resources: Blatchley, 04a  
 Limestone, Bloomington quadrangle: Beede, 15  
   Niagaran: Foerste, 98  
   oolitic: Blatchley (R S), 08; Lockhart, 10; Siebenthal, 01a; Bedford and Bloomington: Udden (Jon A), 10a  
   southern Ind.: Ashley, 03  
 Marl, northern Ind.: Blatchley (W S), 01a  
 Martin Co.: Cox (E T), 71  
 Mineral resources: Blatchley (W S), 97c  
 Mineral waters: Blatchley (W S), 03  
 Natural gas: Boyd (C R), 93; Jordan, 92, 94; Kinney, 04; Leach, 96; Leverett, 89a; Phinney, 87, 91; Thompson (M), 86b; Wright (F E), 16  
   origin of rock pressure: Orton, 90c, d  
   southwestern Ind.: Fuller, 03d  
   Trenton limestone: Orton, 89  
 Natural resources: Blatchley (W S), 00, 07  
 Ochreous deposits, southeastern Ind.: Warder, 82  
 Oil, black shales: Ashley, 17  
 Oil and gas fields: Barrett, 17c  
 Oolite and oolitic stone: Blatchley (W S), 01b  
 Parke Co.: Hobbs (B C), 72  
 Patoka quadrangle: Fuller, 04  
 Peat deposits: Taylor (A E), 07, 09  
 Perry Co.: Cox (E T), 72  
 Petroleum: Barrett, 15; Benedict, 92; Blatchley (W S), 97a, 98c, 01c, 07a; Bownocker, 17a; Wright (F E), 16  
   Greene Co.: Van Gorder, 16  
   Oakland City area: Blatchley (R F), 11  
   Princeton field: Blatchley (R S), 07  
   southwestern Ind.: Fuller, 03d  
   Sullivan Co.: Barrett, 14  
   Terre Haute: Hunt, 71f; Waldo, 90  
   Trenton limestone: Orton, 89  
 Pike Co.: Collett, 72a  
 Portland cement: Blatchley (W S), 01  
 Putnam Co.: Cox (E T), 71  
 Sandstone: Hopkins (T C), 96a; Carboniferous: Hopkins (T C), 96  
 Silver Creek hydraulic limestone: Siebenthal, 01  
 Spencer Co.: Cox (E T), 71  
 Sullivan Co.: Collett, 71; oil field: Barrett, 14  
 Vanderburgh Co.: Collett, 76  
 Vermilion Co.: Bradley, 69  
 Vigo Co.: Cox (E T), 71, 76; Scovell, 97  
 Warrick Co.: Cox (E T), 71  
 Whetstone and grindstone rocks: Kindle, 96a

*Historical geology.*  
 Age of rocks near Kentland: Greene (G K), 98  
 Allen Co.: Dryer, 89

**Indiana—Continued.***Historical geology—Continued.*

Arnheim formation: Foerste, 12b  
 Bartholomew Co.: Elrod, 82  
 Bedford oolitic limestone: Hopkins (T C), 97a, c  
 Benton Co.: Gorby, 86  
 Black slate, New Albany: Duden, 97  
 Bloomington quadrangle: Beede, 15  
 Boone Co.: Gorby, 86a  
 Borings: Leverett, 89a; Terre Haute: Guyot, 69  
 Boulder belts, western Ind.: McBeth, 01a  
 Brown Co.: Collett, 75  
 Cannelton field, Perry Co.: Lesley (J), 62  
 Carboniferous sandstones, western Ind.: Hopkins (T C) 96  
 Carroll Co.: Thompson (M), 92a  
 Cass Co.: Elrod, 94  
 Cincinnati group: Miller (S A), 74a  
 Cincinnati series: Cumings, 08; Tanner's Creek section: Cumings, 13  
 Clark Co.: Borden, 74  
 Clay Co.: Collett, 76a; Cox (E T), 69  
 Clinton Co.: Thompson (W H) 86  
 Clinton formation: Foerste, 96  
 Coal fields: Ashley, 00  
 Coal Measures: Lesquereux, 62  
 Conglomerates, origin: Hopkins (T C), 96d  
 Crawford Co.: Collett, 79  
 Crawfordsville crinoid locality: Braun, 73; Hovey (E O), 67  
 Danville quadrangle: Campbell (M R), 00  
 Daviess Co.: Cox (E T), 71  
 Dearborn Co.: Bigney, 92, 16  
 Decatur Co.: Elrod, 83  
 DeKalb Co.: Dryer, 89  
 Delaware Co.: Phinney, 82  
 Devonian: Kindle, 01; and Mississippian, southern Ind.: Kindle, 99  
 Devonian limestones: Stauffer, 07a  
 Ditney quadrangle: Fuller, 02  
 Dubois Co.: Collett, 72  
 Falls of the Ohio region: Clapp (A), 41  
 Fayette Co.: Elrod, 84  
 Flatwoods region, Owen and Monroe cos.: Malott, 15  
 Floyd Co.: Borden, 74  
 Fountain Co.: Brown (R T), 82  
 Franklin Co.: Haymond, 69  
 General: Blatchley (W S), 96, 98; Brown (R T), 54; Collett, 80, 82, 83, 84, 84b; Cox (E T), 69, 72, 75, 79; Hall, 43c; Hopkins (T C), 04a; Leverett, 89a, 05; Owen (D D), 38, 39, 46, 59, 62; Phinney, 91; Thompson (M), 86  
 Geologic map: Branner, 86d; Gorby, 94, 94a; Hopkins (T C), 04c; Sayler, 65a  
 Geologic scale: Blatchley (W S), 98  
 Gibson Co.: Collett, 74c  
 Gold-bearing drift: Sutton, 82  
 Goniatile beds, Rockford: Hall, 62a  
 Goniatile limestone, Rockford: Meek, 61; Jackson Co.: Christy, 51  
 Grant Co.: Phinney, 84  
 Greene Co.: Van Gorder, 16  
 Hamilton Co.: Brown (R T), 84a  
 Hancock Co.: Brown (R T), 86  
 Harrison Co.: Collett, 79



## Indiana—Continued.

*Historical geology.*—Continued.

- Henry Co.: Phinney, 86  
 Huntington Co.: Cox (E T), 76  
 Huron group in Monroe and Greene cos.; Greene (F C), 11a  
 Indiana oolitic limestone: Siebenthal, 08  
 Jackson Co.: Cox (E T), 75; Cresson, 89a  
 Jasper Co.: Collett, 83b  
 Jay Co.: McCaslin, 83  
 Jefferson Co.: Borden, 75a; Culbertson, 16  
 Jennings Co.: Borden, 76  
 Johnson Co.: McCaslin, 84  
 Keokuk group, Crawfordsville: Beachler, 88  
 Kettle holes near Lake Maxinkuckee: Scovell, 96a  
 Knobstone group: Bennett (L F), 98; Price (J A), 98  
   Borden region: Jones (L H), 98  
   distribution: Newsom, 99a  
   eastern escarpment: Bennett (L F), 99  
   New Albany: Newsom, 98b  
 Knox Co.: Collett, 74b  
 Kokomo limestone, age: Kindle, 13d  
 Lagrange Co.: Dryer, 94; Edmunds, 78  
 Lake Co.: Blatchley, 98a  
 Laurel: Prosser, 16  
 Lawrence Co.: Collett, 74a  
 Loess, southwestern Ind., origin: Shaw (E W), 15b  
 Loess and sand dune deposits, Vigo Co.: McBeth, 16  
 Madison, Ordovician-Silurian boundary: Hubbard (G C), 92b  
 Madison Co.: Brown (R T), 84a  
 Marion Co.: Brown (R T), 83  
 Marl-loess, Wabash Valley: Fuller, 03e  
 Marshall Co.: Thompson (W H), 86  
 Martin Co.: Cox (E T), 71  
 Maumee Valley, surface geology: Gilbert, 71b  
 Miami Co.: Gorby, 89  
 Mississippian, southern Ind.: Ashley, 03; Hopkins (T C), 03a  
 Monroe Co.: Greene (G K), 80; Reagan, 04  
 Montgomery Co.: Collett, 76  
 Morgan Co.: Brown (R T), 84  
 Newton Co.: Collett, 83a  
 Niagara: Beachler, 92; Hamilton Co.: Kindle, 02  
 Niagara domes, northern Ind.: Kindle, 03  
 Niagara group unconformities: Elrod, 02  
 Niagaran, northern Ind.: Kindle, 04; Schuchert, 04c; southeastern Ind.: Foerste, 98  
 Noble Co.: Dryer, 94  
 Northern Ind.: Levette, 74  
 Oakland City area: Blatchley (W S), 11  
 Orange Co.: Elrod, 76; Kindle, 96a  
 Ordovician: Foerste, 04a  
   classification: Foerste, 05b  
   southeastern Ind.: Cumings, 01c  
   Vevay: Cumings, 01b  
 Ordovician and Silurian: Foerste, 04  
 Ordovician-Silurian contact: Foerste, 04b  
 Owen Co.: Collett, 76  
 Paleozoic limestones and shales: Blatchley (W S), 06a  
 Parke Co.: Hobbs (B C), 72  
 Patoka quadrangle: Fuller, 04

## Indiana—Continued.

*Historical geology.*—Continued.

- Perry Co.: Cox (E T), 72  
 Pike Co.: Collett, 72a  
 Porter Co.: Blatchley (W S), 98a  
 Posey Co.: Collett, 84a  
 Pulaski Co.: Thompson (W H), 89b  
 Putnam Co.: Collett, 76b, 80a  
 Randolph Co.: Phinney, 83  
 Richmond, Wayne Co.: Moore (J), 93a; Plummer, 43  
 Richmond beds, Spades: Coryell, 15a  
 Richmond group: Foerste, 03; Nickles, 03  
   Elkhorn Falls: Dennis, 99  
   upper: Shideler, 14  
 Ripley Co.: Borden, 76  
 Rush Co.: Elrod, 84b  
 St. Paul: Beachler, 91  
 Scott Co.: Borden, 75  
 Sections, natural gas wells: Gorby, 89a  
 Shelby Co.: Collett, 82a  
 Silurian, southeastern Ind.: Foerste, 97  
 Silver Creek hydraulic limestone: Siebenthal, 01  
 Spencer Co.: Veatch (A C), 98  
 South Bend: Whitten, 98  
 Southeastern Ind.: Foerste, 00  
 Southern Ind., section, Hanover to Vincennes, Newsom, 98, 98a, 03  
 Starke Co.: Thompson (W H), 86  
 Steuben Co.: Dryer, 92  
 Structural features: Cubberly, 94  
 Sullivan Co.: Collett, 71  
 Tippecanoe Co.: Gorby, 86  
 Unconformity at base of Onondaga: Kindle, 13b  
 Union Co.: Elrod, 84a  
 Vanderburgh Co.: Collett, 76  
 Vegetable remains in drift: Winchell (N H), 76b  
 Vermilion Co.: Bradley, 69  
 Vigo Co.: Cox (E T), 71, 76; Scovell, 97  
 Wabash arch: Gorby, 86; Thompson (M), 89a  
 Wabash Co.: Elrod, 92  
 Wabash Valley: Collett, 72b  
 Waldron formation: Kindle, 09d; Price, 00  
 Warren Co.: Collett, 74  
 Washington Co.: Gorby, 86  
 Wayne Co.: Cox (E T), 79  
 White Co.: Thompson (W H), 89b  
 White River area: Shannon, 07  
 Whitley Co.: Dryer, 92

*Mineralogy.*

- Halloysite, Lawrence Co.: Goldsmith, 76  
 Meteorite, Harrison Co.: Smith (J L), 59a  
   Howard Co.: Smith (J L), 74  
   Kokomo, Howard Co.: Cohen, 92  
   Plymouth, Marshall Co.: Ward (H A), 95  
   Rochester: Shepard, 77; Smith (J L), 77d  
   South Bend: Farrington, 06

*Paleontology.*

- Actinocrinus: Whitfield, 00b  
 Bartholomew Co., Mammalia: Edwards (J J), 02  
 Barycrinus hoveyi, Crawfordsville: Whitfield, 04a  
 Batocrinus: Casseday, 54



**Indiana—Continued.***Paleontology—Continued.*

- Batostomas, Richmond series: Cumings, 12b  
 Bison, Vincennes: Middleton, 00  
 Black slate: Whitfield, 75a  
 Bloomington quadrangle, paleobotany: Jackson (T F), 15  
 Brachiopoda, Richmond: Dennis, 99a  
 Brazil limestone fauna: Greene (F C), 11a  
 Buthotrephis, Silurian: White (D), 01  
 Calymene nasuta, Osgood: Ulrich, 79b  
 Camerate crinoids, Niagara group: Wachsmuth, 92  
 Carcinosoma, Kokomo: Claypole, 94  
 Cariacus dolichopsis: Cope, 78s  
 Castoroides: Moore (J), 90a, b  
     Greenfield, Ind.: Moore (J), 00  
     Randolph Co.: Moore (J), 91, 93  
 Catalog of fossils: Kindle, 98  
 Carboniferous: Hall, 64c; White (C A), 78e, 84b  
     Echinodermata: Miller (S A), 89b, 90  
     fish, Harrison Co.: Newberry, 79 a  
     Invertebrata: Gurley (W F E), 83, 84; Worthen, 84  
 Cincinnatian: Cumings, 08; Foerste, 09c, 10, 12a; James (J F), 91; James (U P), 74b; Miller (S A), 74, 78, 78b, 81b, d, 82a, e, 94c, e; Ulrich, 79  
     Brachiopoda: Miller (S A), 75  
     Cephalopoda: Miller (S A), 75a  
     Crustacea: Miller (S A), 74b  
     Gastropoda: Miller (S A), 74d  
     Pelecypoda: Miller (S A), 74c, 81a  
     Protozoa: James (J F), 87  
     Tanner's Creek: Cumings, 13  
 Clinton: Foerste, 89a  
 Coal Measures: Ashley, 99  
 Collettosaurus: Cox (E T), 74b  
 Corals, Devonian: Greene (G K), 98  
     Franklin Co.: Moore (D R), 86  
     Niagaran and Devonian: Hall, 83i  
 Cordaitan wood, black shale: Elkins, 14  
 Crinoidea: Lyon, 60, 61a, 62; Springer, 11a  
     Carboniferous: Hall, 61e; Meek, 65h; Miller (S A), 90b  
     Crawfordsville: Bassett, 85; Beachler, 87, 89; Braun, 73; Hovey, 67; Meek, 69c, 70b; Miller (S A), 82b  
     Devonian: Miller (S A), 94, 96a  
     Hamilton beds, Charlestown: Wood (Elvira), 01a  
     Mississippian: Miller (S A), 97  
     Niagaran, St. Paul: Beachler, 89a  
     Waldron: Springer, 02  
 Cystidea, Jefferson Co.: Hubbard (G C), 92  
 Descriptions of fossils: Greene (G K), 98  
 Devonian: Kindle, 01; Miller (S A), 82e; and Mississippian, southern Ind.: Kindle, 99  
 Dicotyles, Gibson Co.: Leidy, 60b  
 Dictyophyton, Crawfordsville: Whitfield, 81a  
 Dinotherium, Evansville: Casselberry, 45  
 Duncanella, Niagara group: Nicholson, 74f  
 Echinodermata, Cincinnatian: Meek, 72c  
 Elephas primigenius, Monroe Co.: Wylie, 59  
 Eurypterids, Kokomo limestone, age: Kindle, 13d  
 Eurypterus, Kokomo: Miller (S A), 96b

**Indiana—Continued.***Paleontology—Continued.*

- Fish, Macropetalichthys: Norwood, 46a; Park Co.: Hitchcock (E), 56  
 Fossil trees, New Harmony: Owen (D D), 43b  
 Franklin Co.: Moore (D R), 85  
 Gastropoda, Spergen: Roundy, 14  
 General: Collett, 80; Greene (G K), 97; Owen (R), 62; Stirrup, 86; Thompson (W H), 89; White (C A), 80d  
 Goniatite beds fauna, Rockford: Hall, 60c  
 Hamilton fossils: Hall, 60b  
 Harrison Co.: Collett, 79; Carboniferous fish: Newberry, 79a  
 Holocystites, Niagaran: Miller (S A), 78c, 79c, 92b  
 Insect, Carboniferous: Smith (S I), 71  
 Invertebrata: Meek, 65j  
 Jefferson Co.: Borden, 75a; Cornett, 75  
 Keokuk group, Crawfordsville: Beachler, 88  
 Kokomo fauna: Kindle, 13d  
 Lituites, Wabash City: Whitfield, 85b  
 Macropetalichthys, southern Ind.: Norwood, 46  
 Mammalia, Evansville: Leidy, 54f  
 Mastodon, Randolph Co.: Moore (J), 97a  
 Megatherium, Franklin Co.: Haymond, 44  
 Mollusca, old forest bed: Billups, 02  
 Montgomery Co.: Collett, 76  
 Mysticocrinus, St. Paul: Springer, 18  
 Naticopsis, coloration: Girty, 12a  
 Niagaran fauna: Hall, 76; Miller (S A), 79, 80a  
     northern Ind.: Kindle, 04; Cephalopoda: Newell, 88  
     Waldron: Hall, 82a, 83c; Miller (S A), 78  
 Onychaster, Crawfordsville: Sollas, 13  
 Ordovician, Jefferson Co.: Hubbard (G C), 92a; Vevay: Cumings, 01b  
 Orthothetes, Salem limestone, Monroe Co.: Cumings, 01a, d  
 Ostracoda: Ulrich, 90f  
 Paleozoic Invertebrata: McChesney, 67; Meek, 66c; Miller (S A), 92, 93, 94b, 96c; White (C A), 82b  
 Pentamerus, Delphi: Conrad, 55d  
 Pisces: Newberry, 78d  
 Plantae, black slate, New Albany: Duden, 97  
     Carboniferous: Lesquereux, 84  
     lower Pennsylvanian: Jackson (T F), 17  
     marine Carboniferous: Lesquereux, 76e  
     Orange Co.: White (D), 96  
     Posey Co.: Owen (D D), 43a  
 Pleistocene vertebrates: Hay (O P), 12  
 Posey County, Quaternary Mollusca: Daniels, 05  
 Post-Pliocene Mammalia: Cope, 84a; Thompson (M), 86a  
 Richmond area, list of fossils: Haines, 79  
 Richmond fossils: Foerste, 17b; Plummer, 43; Spades: Coryell, 15a  
 Salem limestone fauna: Cumings, 06  
 Seaweeds (?), Fayette Co.: White (D), 03c  
 Shark, Carboniferous: Hitchcock (E), 56d  
 Silurian fossils: Foerste, 09, 09b; White (C A), 78e; Bryozoa: Ulrich, 82  
 Spergen Hill fauna: Hall, 83j; Whitfield, 82  
 Sponges, Hamilton group: Whitfield, 05a  
 State museum, catalog: Thompson (M), 89d



**Indiana—Continued.****Paleontology—Continued.**

- Strophochetus: Seely, 86  
 Trilobites, new bed of: Bigney, 11  
 Van Cleve's fossil corals: Hall, 83h  
 Waldron fauna: Hall, 64b, 83k; Kindle, 09b;  
 Tarr Hole: Cumings, 00a

**Petrology.**

- Basanite, Crawford Co.: Goldsmith, 91

**Physical geology.**

- Caves: Blatchley (W S), 97b; Farrington, 01e  
 Hanover: Hovey (H C), 78  
 Mitchell limestone: Greene (F C), 09  
 Subcarboniferous: Hovey (H C), 78  
 University cave, Greencastle, Putnam Co.:  
 Reasoner, 84  
 Versailles: Bigney, 16a  
 Wyandotte, Crawford Co.: Collett, 79  
 Caves and sinks: Elrod, 99  
 Conglomerate of postglacial origin, Jefferson Co.:  
 Culbertson, 11  
 Conglomerates, origin: Hopkins (T C), 96d  
 Erosion, Big Creek, Jefferson Co.: Culbertson,  
 08  
 Crawfordsville: Hovey (H C), 93  
 Jefferson Co.: Culbertson, 98  
 Normal Brook, Vigo Co.: Dryer, 11a  
 pre-Pleistocene: Beachler, 93  
 Richmond: Moore (J), 93b  
 Faulting, coal measures: Ashley, 98a  
 Mount Carmel: Logan, 18  
 General: Campbell (J T), 84  
 Keokuk, dip at Bloomington: Kindle, 95  
 Natural gas explosion, Waldron: Newsom, 02a  
 New Albany shale, jointing: Culbertson, 12a  
 Niagara domes, northern Ind.: Kindle, 03  
 Oolitic limestone: Hopkins (T C), 08  
 Ripple marks, Jefferson Co.: Culbertson, 03;  
 Richmond: Moore (J), 02  
 Structural features: Clobberly, 94; Gorby, 89a;  
 western Ind.: Ashley, 98  
 Structural geology: Barrett, 17c  
 Travertine deposit, Tippecanoe Co.: Wilson  
 (G W), 06  
 Wabash arch: Thompson (M), 89a  
 Wave marks, Cincinnati limestone, Franklin  
 Co.: Shannon, 95  
 Weathering of Subcarboniferous limestone:  
 Cumings, 06b; of north and south slopes:  
 Culbertson, 00

**Physiographic geology.**

- Beaches at south end of Lake Michigan, origin:  
 Wright (G F), 17a  
 Bloomington quadrangle: Beede, 11a  
 Crawfordsville: Hovey (H C), 93  
 Ditney quadrangle: Fuller, 02  
 Drainage, southern Ind.: Newson, 02  
 Drift deposits: Claypole, 82; Newberry, 84a  
 Dunes, northwestern Ind.: Barrett, 17  
 Eagle Lake (Winona Lake) region: Mills (W M),  
 04  
 Esker, Tippecanoe Co.: McBeth, 05  
 Eskers and esker lakes: Dryer, 01a  
 Flatwoods region, Owen and Monroe cos.:  
 Malott, 15  
 Fort Wayne region: Price (J A), 01, 01a  
 General: Campbell (J T), 84; Dryer, 97

**Indiana—Continued.****Physiographic geology—Continued.**

- Geographic features: Dryer, 07  
 Glacial boundary: Wright (G F), 84  
 Glacial gravels: Blatchley (W S), 06a  
 Glacial history: Wood (H W), 16  
 Glaciation: Coulter, 84; Hay (O P), 12; Lever-  
 ett, 96a, 97a, 07a, 15; Newberry, 84a;  
 Thompson (M), 86, 89  
 Erie basin: Leverett, 02  
 Jasper Co.: Purdue, 95  
 Montgomery Co.: Coulter, 83  
 northern Ind.: Montgomery, 99a  
 Ohio basin: Leverett, 02  
 results: Shannon, 12  
 Richmond: Moore (J), 97  
 Wabash-Erie region: Dryer, 94a  
 Indianapolis: Dryer, 18  
 Kankakee Valley: Montgomery (H T), 99  
 Lakes, northern Ind.: Blatchley (W S), 01a;  
 Levette, 76; Tippecanoe basin: Scott (W),  
 16, 16a  
 Loess and sand dune deposits, Vigo Co.: Mc-  
 Beth, 16  
 McCormicks Creek: Barrett, 17b  
 Maxinkuckee Lake: Thompson (W H), 86a  
 Meanders of Muscatatuck, Vernon: Dryer, 99a  
 Monroe Co., Bean Blossom Valley: Marsters, 02  
 Moraines, northern Ind.: Leverett, 89c  
 Morainic lakes: Dryer, 97  
 Normal Brook, Vigo Co.: Dryer, 11a  
 Patoka quadrangle: Fuller, 04  
 Pleistocene river channel: Beachler, 94  
 Porter Co., Salt Creek: Bennett (L F), 00  
 Preglacial channel, eastern Ind.: Bownocker, 99  
 Preglacial valleys: Clem, 11  
 Sand areas: Shannon, 12a  
 Sand dunes: Bailey (E S), 17  
 Shades: Barrett, 17a  
 Shawnee Mound, Tippecanoe Co.: McBeth, 15  
 Southern Ind.: Ashley, 03; Cumings, 12a; New-  
 som, 98a  
 Spencer Co.: Veatch (A C), 98, 98a  
 Steuben Co.: Dryer, 92  
 Terraces, lower Wabash: Scovell, 99; White-  
 water River: Hole, 12  
 Terre Haute area, Vigo Co.: Dryer, 10a, 11, 11a  
 Tippecanoe, an infantile drainage system: Mc  
 Beth, 10  
 Tippecanoe Co., Wabash River terraces: Mc-  
 Beth, 02; Wea Creek: McBeth, 02a  
 Tippecanoe Valley: Breeze, 02, 03  
 Valley trenching and gradation plains, south-  
 ern Ind.: Malott, 16  
 Wabash River, ancient: McBeth, 16a  
 Wabash Valley: Dryer, 13; McBeth, 00, 01  
 White River drainage: Shannon, 07  
 Whitley Co.: Dryer, 92
- Underground water.**  
 Bloomington quadrangle, subterranean drain-  
 age: Beede, 11a  
 General: Beede, 13a; Cumings, 14; Leverett,  
 97, 05  
 Mineral waters: Blatchley (W S), 03  
 Northern Ind.: Leverett, 99a  
 North-central Ind.: Capps, 10b  
 Southern Ind.: Cumings, 12a; Leverett, 99b



**Indiana folio**, Pa. (no. 102): Richardson (G B), 04a  
**Indian Ladder section**, N. Y.: Prosser, 07  
**Indicator veins**: Storms, 99i  
**Indicia of dip in rocks**: Logan, 18a  
**Indio region**, Cal.: Mendenhall, 09b  
**Indium**: Browning, 17b  
**Induration of sandstone**: Wadsworth, 83c  
**Infusoria**.

**Descriptions**: Bailey (J W), 41, 42, 42a; Ehrenberg, 43; Johnson (A S), 52  
**Maine**, Newfield: Jackson, 41b  
**Maryland**: Bailey (J W), 45c, d; Piscataway: Bailey (J W), 44  
**Massachusetts**: Hitchcock (E), 41  
**New York**, southeastern: Mather, 43; West Point: Bailey (J W), 38; Ehrenberg, 39  
**Oregon**: Bailey (J W), 45  
**Southern States**: Bailey (J W), 51a  
**Virginia**: Bailey (J W), 45c, d; Petersburg: Bailey (J W), 43, 44

**Infusorial earth**. *See also* Diatomaceous earth.

**California**: Aubury, 06  
**General**: Dolbear, 15  
**Nova Scotia**, Queens Co.: Faribault, 16  
**Pacific coast**: Edwards (A M), 91

**Inliers**, types of: Ruedemann, 09

**Innoko district**, Alaska: Maddren, 09b, 10

**Innoko-Iditarod region**, Alaska: Eakin, 13b

**Insecta**.

**Air-breathing**: Dawson (J W), 95a  
**American Paleozoic**: Handlirsch, 06b  
**Ancestry**: Tothill, 16  
**Anthomyid fly**: Cockerell, 13a  
**Anthracomartus**, Arkansas: Harvey (F L), 86a  
**Ants**, South Park, Colo.: Scudder, 77d  
**Aphidae**, Tertiary: Scudder, 93a  
**Aphididae**, Florissant: Cockerell, 08k  
**Archipolypoda**, Carboniferous **Myriapoda**: Scudder, 82a  
**Archoblattina**: Sellards, 03a  
**Asilid fly**: Cockerell, 13i  
**Bee**: Cockerell, 11a; leaf-cutting: Cockerell, 08d, 10d  
**Beetles**, Sangamon peat, Ill.: Wickham, 17  
**Tertiary**, Colorado: Cockerell, 18  
**Bibliography**: Scudder, 80a, 90b  
**Blattoid from Montana Cretaceous**: Handlirsch, 06a  
**Bombyliidae**, Florissant: Cockerell, 14a  
**Borings**, insect, in Cretaceous lignite: Hollick, 06d  
**British Columbia**: Scudder, 79b  
**Quesnel**, Tertiary: Scudder, 77b, 78b  
**Tertiary Hemiptera**: Scudder, 95a  
**Tertiary lake deposits**: Handlirsch, 10  
**Butterflies**: Scudder, 75, 89, 89a; Florissant: Cockerell, 07f  
**Caddis fly**, Leda clays, Ottawa: Scudder, 95c  
**Carabidae**, interglacial, Toronto, Ont.: Scudder, 77a  
**Carboniferous**: Scudder, 82g, 85d  
**affiliation with European forms**: Scudder, 76e  
**horizons of**: White (D), 06  
**Illinois and Ohio**: Scudder, 68c  
**Indiana**: Smith (S I), 71  
**list**: Scudder, 76f  
**Catalog**: Scudder, 91

**Insecta—Continued**.

**Caterpillar**, Florissant: Cockerell, 07f  
**Cercopidae**, Florissant: Cockerell, 08b  
**Ceropidae**, Florissant: Rohwer, 09  
**Chrysopidae**: Cockerell, 08e  
**Cicada**, Florissant: Cockerell, 06f  
**Cockroaches**: Scudder, 86e, 90c, 95, 95b  
**Carboniferous**, Cape Breton: Scudder, 74  
**geological history**: Sellards, 06b  
**Kansas Coal Measures and Permian**: Sellards, 08g  
**Mazon Creek**, Ill.: Scudder, 82e, 85g  
**Mesozoic**: Scudder, 86c  
**Paleozoic**: Scudder, 79a; Sellards, 03, 04  
**Pennsylvanian**, Pennsylvania: Cockerell, 18  
**Richmond**, Ohio: Scudder, 88  
**Texas**: Cockerell, 12d  
**Triassic**, Colorado: Scudder, 85g, h  
**Coleoptera**: Wickham, 13  
**Canada**: Scudder, 95a  
**Florissant**: Cockerell, 07e, 10b, 11, 13d, e, j; Wickham, 09, 10, 11, 12, 12a, 13a, 14, 16a, 17a  
**North America**: Scudder, 00  
**Port Kennedy bone cave**, Pa.: Horn, 76  
**Rocky Mountain Tertiary**: Scudder, 76a  
**Tertiary rhynchophorous**: Scudder, 93  
**Toronto**, interglacial clay: Scudder, 00a  
**Colorado**, Florissant: Brues, 06, 08, 08a, 10; Cockerell, 06, 06c, e, f, h, 07a, c, e-j, 08b-t, 09, 09a-h, 10b, 11, 12, 12c, 13a, b, d, e, j, 14c-f, 15b, e, 16, 17, 17a, c; Mitchell, 08; Rohwer, 08, 08a, b, c; Scudder, 92, 00; Wheeler (W M), 06, 08; Wickham, 08  
**Fairplay**, Triassic: Scudder, 84c, 90e  
**Green River**, Tertiary: Scudder, 67c, 78a  
**Crabronidae**, Florissant: Cockerell, 10c  
**Cretaceous**, Dakota group: Hagen, 82  
**Devonian**: Scudder, 81a  
**New Brunswick**: Hagen, 81; Scudder, 65, 65a  
**Dictyoneura**: Scudder, 85d  
**Diptera**, Florissant: Cockerell, 08f, 09a, 14e, 17c  
**Dragon-fly**, Florissant: Cockerell 07c, 08r; Paleozoic, venation of wings: Sellards, 07b  
**Early types**: Scudder, 79  
**Earwigs**: Scudder, 76b  
**Elateridae**: Wickham, 08, 16  
**Eocene**, Colorado: Cockerell, 08a, 09f  
**Fly** (*Sackenia gibbosa*), Green River beds: Cockerell, 07  
**Fungus-gnat**, Florissant: Cockerell, 15e  
**General**: Cockerell, 13g, 15g, 17d, 18a; Dawson (J W), 85b; Handlirsch, 07; Scudder, 86, 90, 90i  
**Generic names based on American types**: Cockerell, 09i  
**Geologic history**: Scudder, 85b; of myriapods and arachnids: Scudder, 85i; of parasitic Hymenoptera: Brues, 10a  
**Geracus**, Little River group, New Brunswick: Matthew (G F), 97b  
**Glossina** (tsetse-fly), Florissant: Cockerell, 16c  
**Greenland**, Cape Dalton, Tertiary: Henriksen, 18  
**Haplophlebiium**, Cape Breton: Scudder, 67a



## Insecta—Continued.

- Hemiptera, Tertiary: Scudder, 90h; and Heteroptera, Florissant: Kirkaldy, 10  
Hymenoptera, Florissant: Brues, 06, 10; Cockerell, 06e  
Illinois, Mazon Creek: Cockerell, 16, 17b; Dana (J D), 64a; Handlirsch, 11; Scudder, 65b, 68  
Isoptera: Cockerell, 13  
Kansas, Comanche beds: Gould, 99; Permian: Sellards, 03c  
Larva, Connecticut River sandstone: Scudder, 67b, 86a  
Mantis: Cockerell, 08h  
Maryland, Pleistocene: Sellards, 06a  
Massachusetts, Fort River, Pleistocene beetles: Scudder, 98  
Nantucket Island: Goldsmith, 79a  
Mydaid fly: Cockerell, 13h  
Mylacris, Carboniferous cockroach: Scudder, 84a  
Myriapoda, Carboniferous, Illinois: Scudder, 90d  
Nemestrinidae: Cockerell, 08s, t  
Neuroptera: Scudder, 66  
Florissant: Scudder, 82f  
Green River, Wyo.: Scudder, 82f  
New Brunswick, Devonian: Dawson (J W), 90e; Scudder, 67a, 80  
Little River group: Matthew (G F), 95, 10c  
southern: Matthew (G F), 89b  
North America: Scudder, 68a, b  
Nova Scotia, Cape Breton, Carboniferous: Scudder, 75c, 76c; South Joggins: Dawson (J W), 92a  
Odonata: Calvert, 13; Muttkowski, 10; Ris, 10  
Old-world types at Florissant: Cockerell, 07a  
Ontario, Ottawa region, Leda clays: Ami, 95d; Scarboro, interglacial: Scudder, 90g  
Origin and sequence in Paleozoic times: Scudder, 79  
Orthoptera, Florissant: Cockerell, 14c; South Park, Colo.: Scudder, 76  
Osmylidae (Neuroptera): Cockerell, 08g  
Palaeodictyoptera: Scudder, 85a  
Paleozoic: Scudder, 79, 85f  
catalog: Lacoe, 83  
Nova Scotia and New Brunswick: Dawson (J W), 67b; Scudder, 67  
Hexapoda, classification: Scudder, 85a, b  
Palephemera, Connecticut River sandstone: Dana (J D), 62  
Pennsylvania, Pittstown: Scudder, 77c  
Permian: Sellards, 06c; Texas: Sellards, 11  
Phoridae, Florissant: Brues, 08a  
Phryganea: Cockerell, 13f  
Phylogeny: Handlirsch, 06  
Physopoda, Colorado: Scudder, 75a  
Phytophagous Hymenoptera, Florissant: Brues, 08  
Pierre formation, Petropterion: Cockerell, 12b  
Protoblattid family, Cretaceous, Montana: Mitchell, 08  
Quaternary, California: Grinnell, 08  
Raphidia: Cockerell, 12c  
Rhode Island, Carboniferous: Scudder, 93b  
Rhynchophora, Tertiary: Scudder, 92a  
Rocky Mountains: Scudder, 72, 90j, 91a

## Insecta—Continued.

- Saw-flies, Florissant: Cockerell, 06h, 08, 14d  
Scolytid: Hopkins (A D), 00  
Scudder's work: Cockerell, 11h  
Syntomostylus? fortis: Cockerell, 09j  
Tenthredinoidea, Florissant: Rohwer, 08a, b  
Termes, Vermilion Co., Ill.: Scudder, 78f  
Termitina, Florissant: Scudder, 84b  
Tertiary: Scudder, 90a  
Colorado and Wyoming: Scudder, 78  
fungus gnat: Johannsen (O A), 12  
Green River and Florissant: Cockerell, 08a  
White River: Scudder, 77  
Tipulidae, Florissant: Scudder, 94  
Tortricid moth: Cockerell, 07h  
Trichocnemis: Muttkowski, 10; Ris, 10  
Tsetse flies: Cockerell, 07i, 09c, 18  
Wasps, Florissant: Cockerell, 07j; Rohwer, 08, 08c, 09b  
Water-bug, Florissant: Cockerell, 06c  
White ants: Scudder, 81c  
Wing of extreme simplicity: Scudder, 78d  
Wing structure, Carboniferous Insecta: Scudder, 65d  
Insectivora, genetic relations: Gregory (W K), 10b  
Intercision, a drainage modification: Goldthwait, 08b  
Interference ripples: Kindle, 14e  
Interglacial chronometer: Winchell (N H), 92f  
Interglacial gorges of Six Mile Creek, Ithaca, N. Y.: Rich, 15a  
Interglacial periods. *See* Glacial.  
International Geological Congress, 1894: Frazer, 94  
Intraformational conglomerates and breccias, origin and classification: Field, 16  
Intraformational corrugation: Clarke (J M), 14c  
Intrusions. *See also* Dikes; Igneous and volcanic rocks; Laccoliths; Magmas.  
Arizona, Carrizo Mountain: Emery, 16  
Boulder batholith: Knopf, 14c  
British Columbia, Field area: Allan, 14  
Classification: Daly (R A), 05b  
Colorado: Hills, 95a  
Georgetown quadrangle: Ball (S H), 08  
Monarch and Tomichi districts: Crawford (R D), 13  
Rocky Mountains: Hills, 91c  
Spanish Peaks region: Hills, 90b  
Conglomeratic, Navajo Reservation: Gregory (H E), 15b  
Connecticut, New Haven region: Dana (J D), 91c; Preston region: Loughlin, 12  
Cordilleras: Lindgren, 15a; forty-ninth parallel: Daly (R A), 13  
Duluth lopolith: Grout, 18a  
Experiments: Howe, 01  
General: Burckhardt, 04; Iddings, 14; Russell, 96b; Uglow, 13a  
Hawaii, Kilauea: Powers, 16e  
Igneous intrusions: Rickard, 15a  
Inclusions in dikes, origin: Powers, 15  
Lake Superior region: Whittlesey, 76  
Laws of intrusion: Stevens (B), 11  
Maine, pegmatites: Bastin, 10b  
Massachusetts, Chestnut Hill: Lahee, 10  
Mechanics of igneous intrusion: Daly (R A), 03, 03a; Jaggar, 01; Paige, 16a



## Intrusions—Continued.

- Mexico, northeastern: Garfias, 17  
 Michigan, Mount Bohemia: Wright (F E), 09b  
 Montana, Butte: Lawson, 14a  
   Haystack stock: Emmons (W H), 08  
   Judith Mountains: Weed, 98  
 Nature of intrusions: Russell, 96a  
 New Jersey, Highlands: Fenner, 14  
 Newark trap rocks, New Jersey: Lewis, 07b, 08a; Russell, 78  
 New York, Adirondacks: Bowen (N L), 17b;  
   Cushing, 17; Brewster iron district:  
   Koeberlin, 09  
 Ontario, Haliburton-Bancroft area: Foye, 16;  
   Lake Nipigon trap sheets: Wilson  
   (A W G), 09  
 Palisade diabase, intrusion temperature: Sos-  
   man, 13  
 Pigeon Point, Minn.: Daly (R A), 17b  
 Quebec, St. Bruno Mountain: Dresser, 10a  
 Rhode Island: Loughlin, 10a  
 South Dakota, Black Hills: Russell, 96; north-  
   ern: Irving, 99; pre-Cambrian granite:  
   Paige, 14c, 16a  
 Utah, Wasatch Mountains: Geikie (A), 80
- Invertebrata (general). *See also the phyla* Arthro-  
 poda; Coelenterata; Echinodermata; Mol-  
 lusca; Molluscoidea; Protozoa; Vermes;  
*also* Paleontology; *Incerta sedes*; Prob-  
 lematic organisms.
- Alabama, Eocene: Gregorio, 90; Meyer (O), 87a  
 Alaska: Fischer, 72  
   Cape Lisburne region: Girty, 06  
   Jurassic: Pompeckj, 00  
   Miocene and Cretaceous: Eichwald, 71  
   Neozoic: Dall, 04  
   southeastern, Paleozoic: Kindle, 07  
   Yakutat fauna: Ulrich, 04a  
 Alberta, Bow and Belly rivers: Whiteaves, 85  
   Devonian: Whiteaves, 91  
   Lake Winnipegosis region, Silurian: Whit-  
   eaves, 91b  
   Saskatchewan country, Cretaceous: Whit-  
   eaves, 87b  
 Alexandrian series, Illinois and Missouri: Sav-  
   age, 13a  
 Amsden formation, Wind River Mountains,  
   Wyo.: Branson, 18  
 Anatomy and physiology in invertebrate ex-  
   tinct organisms: Ruedemann, 10a  
 Anticosti Island: Twenhofel, 14  
 Arctic: Etheridge, 78; Whitfield, 00a  
   Baffin Land, Trenton: Schuchert, 00  
   Boothia Felix and King William Land,  
   Ordovician: Hortedahl, 12  
   Ellesmere Land: Hortedahl, 14  
   Frobisher Bay: Emerson (B K), 79  
   Kennedy channel, Silurian: Meek, 65d  
   König Oscar and Heiberg Land: Tscherny-  
   schew, 16  
   Triassic: Kittl, 07  
 Arizona, Fort Apache: Reagan, 04b  
 Arkansas, Batesville fauna: Girty, 15a; Weller,  
   97  
   Boone chert fauna: Girty, 15b  
   Boone limestone fauna: Girty, 15c  
   Carboniferous: Shumard (B F), 53

## Invertebrata (general)—Continued.

- Arkansas: Coal Measures marine: Smith (J P),  
   96  
   Cretaceous: White (C A), 82a  
   Fayetteville shale: Girty, 10a  
   northern: Williams (H S), 99a  
 Bear River fauna: White (C A), 95  
 Beckmantown fauna, Mohawk Valley: Cleland,  
   00, 03  
 Bermuda Islands: Verrill, 07  
 Bibliography: Marcou (J B), 85b, c, 86a, b  
   Carboniferous: Weller, 98  
   Mesozoic: Boyle, 93  
 British Columbia, Coast Range, Jurassic:  
   Whiteaves, 78a  
   Mount Stephen: Walcott, 89  
   Queen Charlotte Islands: Burwash, 14; Whit-  
   eaves, 76, 84a, 00  
   Triassic: Whiteaves, 89a  
   Vancouver Island, Cretaceous: Whiteaves,  
   74, 79, 03; Nanaimo group: Whiteaves,  
   95c; Tertiary: Merriam, 96a  
 Buda limestone fauna: Whitney (F L), 11  
 California: Cooper (J G), 88  
   auriferous slates: Meek, 65  
   Carboniferous: Meek, 64  
   Coalinga district: Arnold, 09, 09a, 10  
   Cretaceous: Anderson (F M), 02; Gabb 64a,  
   69; White (C A), 85b  
   Fernando group: English, 14  
   Jurassic: Meek, 64a  
   Miocene: Smith (J P), 12b  
   Mount Diablo Range: Anderson (F M), 05  
   Pliocene: Nomland, 17a  
   San Juan district: Anderson (F M), 14  
   San Pedro: Arnold, 03  
   Santa Clara Valley: Crandall (R), 07  
   Santa Cruz Mountains, Cretaceous and Ter-  
   tiary: Arnold, 08d  
   Summerland district: Arnold, 07e  
   Tejon fauna: Dickerson, 16  
   Temblor Basin: Anderson (F M), 14  
   Tertiary: Conrad, 56b; Gabb, 69  
   Triassic: Gabb, 64  
 Cambrian: Walcott, 84, 86, 89c, 16  
   British Columbia: Walcott, 12c  
   Cape Breton: Matthew (G F), 01c, 03  
   Lower: Walcott, 90  
   Massachusetts: Shaler, 88b; Braintree, tran-  
   sition fauna: Shimer, 07a  
   Mount Stephen, B. C.: Woodward (H), 02  
   New Brunswick: Matthew (G F), 95h  
   Newfoundland: Whiteaves, 78b  
   New York: Ford (S W), 73, 73a, 76; Hall, 73b;  
   Walcott, 87b; Dutchess Co.: Dwight, 89  
   Pioche Mountains: Pack, 06a  
   Rocky Mountains: Hayden, 62a  
   Texas: Shumard (B F), 61  
   Wisconsin and Michigan: Winchell (A), 64  
 Cambro-Silurian, and Devonian: Whiteaves,  
   06b  
 Canada: Kindle, 14; Whiteaves, 87  
   Devonian: Billings, 58, 58d; Whiteaves, 06b  
   Ordovician: Billings, 56b, k, 57, 58, 60d, 65;  
   Raymond (P E), 12d; Salter, 59  
   Paleozoic: Billings, 74  
   Silurian: Billings, 56k, 60b; Whiteaves, 06



## Invertebrata (general)—Continued.

- Carboniferous: Girty, 08a; Gurley (W F E), 83, 84; Hall, 52c; Meek, 69c; Norwood, 55b; Stevens (R P), 58; White (C A), 80, 83f  
 Allegheny and Conemaugh faunas, western Pennsylvania: Raymond (F E), 11b  
 Appalachian region: Morton, 36  
 Arctic regions: Salter, 55  
 Mississippi Valley: Hall, 64c; Meek, 60f, 61b; White (C A), 62a  
 Morrow group: Mather, 15  
 Western States: White (C A), 83d  
 Chapman sandstone: Williams (H S), 16  
 Chazy fauna: Raymond (P E), 05b, 06; Valcour Island: Hudson, 05  
 Chemung fauna: Hall, 62  
 Chester group, Oklahoma: Snider, 15a  
 Cincinnati: Faber, 86; Foerste, 10, 16b; Hall, 45c, 60e, 61, 66, 72b; James (U P), 74, 74a, b, 78, 83, 84, 84a; James (J F), 85d, 91; Meek, 71b, d, 72e, f; Mickleborough, 78; Miller (S S), 74, 75d, 78, 78a, b, 79c, 80e, 81b, g, 82a, d, 92b, 94c, e; Ulrich, 78a, 79; Wetherby, 81a  
 Clinton (Brassfield), Ohio: Foerste, 85, 93; Meek, 72e  
 Coal Measures, Kansas and Missouri: Shumard (B F), 58b; Neosho River section, Kansas: Beede, 06b  
 Color markings retained by a gastropod: Raymond (P E), 06a  
 Colorado: Meek, 75  
 Carboniferous: Girty, 03  
 Cretaceous: Henderson (J), 08b; White, (C A), 82a  
 Lykins fauna: Girty, 12  
 northwestern: Henderson (J), 10a  
 Ordovician: Walcott, 92a  
 Ouray fauna: Girty, 00; Kindle, 09  
 Colorado fauna: Stanton, 93  
 Comanchean, Texas, Kansas and Oklahoma: Cragin, 94b  
 Conemaugh and Pottsville faunas, West Virginia: Price (W A), 18  
 Connecticut, Triassic: Lull, 12b  
 Coprolites: Udden, 98a  
 Cordilleran region: Hall, 77; Meek, 77  
 Costa Rica: Gabb, 60j; Pliocene: Gabb, 81a  
 Cretaceous: Conrad, 57a, 60b; Gabb, 60, 60b, 76; Johnson (C W), 05; Shumard (B F), 53; White (C A), 81e  
 Canada: Whiteaves, 95b  
 catalog: Gabb, 59; Meek, 64c  
 Rocky Mountain region: Delafontaine, 77  
 upper Missouri River region: Hall, 56a; Meek 76  
 western Canada: Whiteaves, 89b  
 western States: White (C A), 79c, 83  
 Cretaceous and Tertiary: Conrad, 57a; Arkansas and Louisiana: Veatch (A C), 06e; Nebraska Terr.: Meek, 56d  
 Cuba, Jurassic: Lea, 40  
 Cypricardia leidy: Lea, 55  
 Descriptions: Meek, 73; Owen (D D), 52a  
 Devonian: Clarke (J M), 07a; Conrad, 42a; Hall, 61b; Ulrich, 86  
 Allegheny region: Kindle, 12

## Invertebrata (general)—Continued.

- Devonian: Jefferson limestone fauna: Kindle, 08b  
 Oriskany, Parlin, Me.: Pirsson, 14  
 Ouray limestone, Colorado: Kindle, 09  
 Devonian black shale fauna, Kentucky: Girty, 98  
 Dwarf faunas: Shimer, 08  
 Dwarfing of fauna of Salem limestone, Indiana: Smith (Essie A), 06  
 Eocene: Conrad, 60b; White (C A), 81e  
 Atlantic Coastal Plain: Clark (W B), 96a; Lyell, 45b  
 Eocene and Oligocene, catalog: Conrad, 66  
 Fernando fauna, Los Angeles, Cal.: Moody, 16  
 Fern Glen fauna: Weller, 09  
 Franklin: Ami, 06; Lambe, 06  
 Fresh and brackish water, catalog: White (C A), 77c  
 General: Atwater, 20; Conrad, 65c; Harlan, 34, 35e; Marcou, 53, 55c; Meek, 71f, 74a; Raymond (P E), 13k  
 Georgia, Clinton: Foerste, 89a  
 Great Basin region: Meek, 60c  
 Greenland, northern: Loriol, 93; western, Cretaceous: Ravn, 11a, 18  
 Jurassic: Madsen, 08; Ravn, 11a  
 Tertiary: Ravn, 03  
 Guadalupian fauna: Girty, 08  
 Guelph fauna: Whiteaves, 06c; New York: Clarke (J M), 03f  
 Hamilton fossils: Hall, 62, 62f  
 Hell Creek beds, Montana: Brown (B), 07  
 Idaho, southeastern, Juratrias: White (C A), 79; Triassic: White (C A), 83c  
 Illinois: White (C A), 78e; Worthen, 90b  
 Carboniferous: Meek, 66a, 73a; Worthen, 83a  
 Mazon Creek: Meek, 65e  
 Niagara fauna: Miller (S A), 80a, 81c; Winchell (A), 66a  
 Orchard Creek shale: Savage, 18b  
 Paleozoic: Meek, 68, 75b  
 Thebes sandstone: Savage, 18b  
 Index fossils of North America: Grabau, 06a, 09f  
 Indiana: Greene (G K), 98; Miller (S A), 92; White (C A), 78e, 82b  
 Carboniferous: White (C A), 84b  
 Cincinnati series: Cumings, 08  
 Clinton: Foerste, 89a  
 Niagaran, Waldron: Hall, 64b, 76, 82a, 83k; Miller (S A), 78  
 Paleozoic: Miller (S A), 94b; White (C A), 80d  
 Silurian: Foerste, 09b  
 Inorganic constituents: Clarke (F W), 17  
 Iowa: Hall, 58; White (C A), 67b, 76a  
 Burlington, "Chemung": White (C A), 62; Winchell (A), 63a  
 Carboniferous: Hall, 59j; Sardeson, 02a; White (C A), 67c  
 Coal Measures fauna: Keyes, 88d, 91d, 92i  
 Davenport: Barris, 80a  
 Devonian: Hall, 73  
 Jones Co.: Weller, 96  
 Kinderhook fauna: Weller, 00d, 01a  
 Paleozoic: Calvin, 90a  
 Rockford shales: Webster, 88a



**Invertebrata (general)—Continued.**

- Ithaca fauna, New York: Kindle, 96  
 Judith River beds: Stanton, 05  
 Jurassic, Black Hills: Whitfield, 06  
   catalog: Meek, 64c  
   fresh-water: White (C A), 86  
   Western States: White (C A), 83e  
 Kansas, Carboniferous: Beede, 00, 02, 16;  
   Bennett (J), 96a; Meeks, 58c, 59b; Schiel,  
   55a  
   Coal Measures: Beede, 99b, 00c; Rogers (A F),  
   00e  
   Cretaceous: Cragin 89, 94; Logan, 98, 99, 99b  
   Permian: Swallow, 58d  
   southern: Stanton, 95a  
 Kentucky: Miller (S A), 92  
   Falls of the Ohio: Cozzens, 46; Hall, 72  
   Silurian and Devonian: Foerste, 06, 09b  
   Trenton: Wetherby, 80b, 81a  
 Kinderhook faunas: Weller, 05d, 06; Rowley,  
   89a  
 Knoxville fauna: Stanton, 95  
 Laramie: White (C A), 78, 83b  
 Lexington fauna: Foerste, 10  
 Little River group: Matthew (G F), 95c  
 Lorraine faunas, New York and Quebec:  
   Foerste, 14a  
 Lower Cambrian: Walcott, 90c  
 Mackenzie River region: Meek, 67  
 Magnesian series: Sardeson, 96b  
 Maine: Williams (H S), 00  
   Devonian: Billings, 69; Clarke (J M), 09a;  
   Pirsson, 14; Whiteaves, 92  
   Silurian: Billings, 69; Williams (H S), 12b  
 Manitoba, Devonian: Billings, 59i  
   Ordovician: Parks (W A), 15  
   Silurian: Billings, 69; Calvin, 92a  
   Stony Mountain: Whiteaves, 95a  
   Trenton, Lake Winnipeg: Whiteaves, 96, 97  
 Marine Carboniferous, Arkansas coal fields:  
   Girty, 07  
 Marshall fauna: Winchell (A), 71b  
 Martinez fauna, Eocene, California: Dickerson,  
   14a; Waring (C A), 17  
 Maryland, Chesapeake Bay: Meyer (O), 88a  
   Eocene: Clark (W B), 01a  
   Miocene: Clark (W B), 04a;  
   Pleistocene: Clark (W B), 06  
   St. Mary's Co.: Shattuck, 07a  
   Upper Cretaceous: Clark (W B), 16b  
 Massachusetts, Boston Basin, Cambrian:  
   Grabau, 00a; drumlins: Crosby, 94a  
   eastern: Burr, 00  
   Marthas Vineyard: Dall, 94a  
 Mercer limestone fauna, Carboniferous: Mark, 11  
 Mesozoic invertebrate faunas: Stanton, 09  
 Mexico: Bárcena, 77a  
   Caprina limestone: Boehm, 99  
   Cerro de Muleros: Böse, 10  
   Coahuila, Permian: Haack, 14  
   Cretaceous: Felix, 91a  
   Jurassic: Felix, 91a; Tehuacan: Nyst, 40  
   Mesozoic: Bárcena, 75b  
   Puebla, San Juan Raya: Villada, 05  
 Michigan, Dundee limestone fauna: Grabau, 13c  
   Grand Rapids, Mississippian: Strong, 72  
   Huron fauna: Winchell (A), 62b

**Invertebrata (general)—Continued.**

- Michigan: Little Bay de Noquette, Richmond:  
   Foerste, 17c  
   Marshall and Coldwater beds: Lane, 00a  
   Marshall fauna: Winchell (A), 62b, 65b  
   Monroe fauna: Grabau, 10  
   Upper Peninsula: Hall, 51c  
 Middle Cambrian: Walcott, 89  
 Minnesota, Ordovician: Sardeson, 01d; Win-  
   chell (N H), 86a  
 Miocene, Astoria and Coos Bay, Oreg.: Dall, 09b  
   Atlantic Coastal Plain: Lyell, 45a  
   catalog: Meek, 64d  
   Central America: Gabb, 81  
 Mississippi, Eocene: Meyer (O), 87a; Jackson,  
   Conrad, 55a  
 Mississippi Valley: Nicollet, 43; Worthen, 84;  
   Paleozoic: Miller (S A), 93  
 Mississippian: Meek, 66d  
 Missouri: Keyes, 94c, d; Miller (S A), 92  
   Carboniferous: Swallow, 63  
   catalog: Hambach, 90  
   Devonian: Rowley, 95, 00a; Swallow, 63  
   Kinderhook fauna: Weller, 99  
   Mississippian: Rowley, 95, 00a, 01  
   Pennsylvanian: Girty, 15d  
   Pike Co.: Rowley, 08  
 Missouri River region: Meek, 61d  
 Montana: Meek, 57; Whitfield, 76  
   Devonian, Three Forks: Raymond (P E), 07  
 Moorefield shale fauna: Girty, 11  
 Mount Whyte fauna: Walcott, 17  
 Naples fauna, western New York: Clarke  
   (J M), 04  
 National Museum collections: Bassler, 09c  
 Nebraska: Barbour, 15e  
   Carboniferous: Geinitz, 66; Meek, 72  
   Cass Co.: Woodruff, 06  
   Dakota fauna: White (C A), 94  
   Permian, Gage Co.: Beede, 01  
 Nettleroth collection: Bassler, 09b  
 Nevada, Eureka district: Walcott, 84  
 New Brunswick, basal series: Matthew (G F), 90  
   Devonian: Clarke (J M), 09a; Whiteaves, 81d  
   Kennebecasis Valley, Cambrian: Matthew  
   (G F), 98  
 Newfoundland, Cambrian: Matthew (G F),  
   99a; Smith Sound, Etcheminian fauna:  
   Matthew (G F), 99b  
 New Jersey: Weller, 03  
   Cretaceous: Morton, 30a, 41b; Weller, 07  
   Timber Creek: Morton, 29e  
 New Mexico, Carboniferous: Newberry, 76a;  
   White (C A), 81  
   Cerrillos Hills: Johnson (D W), 03  
   Coal Measures: Herrick, 00  
   Cretaceous: Meek, 76d  
   Guadalupe Mountains: Shumard (B F), 58d,  
   59a  
   Lake Valley district, Mississippian: Miller  
   (S A), 81f  
   Manzano group: Girty, 09c  
   San Juan Co., nonmarine Cretaceous: Stan-  
   ton, 16  
 New York: Conrad, 41  
   Beekmantown: Walcott, 79c; Whitfield, 89  
   Cambrian: Ford (S W), 72; Hall, 47; Whit-  
   field, 84



## Invertebrata (general)—Continued.

- New York: Cretaceous, Staten Island: Hollick, 92  
 Devonian: Clarke (J M), 09a; Hall, 59; Slocum, 06; Erie Co.: Grabau, 98a; Ontario Co.: Clarke (J M), 85a  
 Essex Co., Crown Point section: Raymond (P E), 02  
 Hamilton fauna: Grabau, 99; Genesee Co.: Monroe, 02  
 Hudson River beds: Ruedemann, 01  
 Livonia: Clarke (J M), 94a  
 Marcellus faunas: Clarke (J M), 01; Wood (Elvira), 01  
 Niagara Falls region: Grabau, 01  
 Niagaran: Ringueberg, 84, 86, 88a  
 Ordovician: Hall, 47  
 Oriskany fauna: Clarke (J M), 00  
 Paleozoic: Ruedemann, 16  
 Schoharie Valley: Grabau, 06  
 Silurian: Hall, 52; Port Jervis: Barrett, 78  
 Trenton: Hall, 50; Walcott, 84b; Rensselaer Co.: Ruedemann, 01a  
 Triarthrus: Harlan, 35b  
 Utica slate fauna: Walcott, 83a  
 Wappinger Valley: Dwight, 84  
 Niagara fauna: Hall, 67e, 71a  
 North Carolina: Emmons (E), 58  
 Craven Co.: Croom, 34  
 Wilmington: Brown (A P), 12a  
 Nova Scotia, Antigonish Co., Silurian: Ami, 95a  
 Cape Breton, Cambrian: Matthew (G F), 02d; Etcheminian fauna: Matthew (G F), 99f  
 Carboniferous: Dawson (J W), 83c  
 Silurian: Hall, 60i  
 Ohio, Carboniferous: Meek, 71e, 75c; Whitfield, 82b  
 Clinton: Foerste, 89a  
 Conemaugh fauna: Mark, 12  
 Devonian: Bownocker, 98; Meek, 71e, 73b; Stauffer, 09; Whitfield, 82b  
 Flint Ridge: Herrick, 87  
 Licking Co.: Herrick, 87  
 Ordovician: Hall, 75a  
 Paleozoic: Whitfield, 91  
 Silurian: Foerste, 17a; Hall, 75a; Meek, 73b  
 Oklahoma, Caney shale: Girty, 09b  
 Carboniferous: Beede, 16  
 Chester group: Snider, 15a  
 McAlester coal field: Girty, 99  
 red beds: Beede, 02c  
 Wewoka formation: Girty, 11b  
 Ontario: Grant (C C), 06, 07  
 Devonian: Billings, 60, 74a; Nicholson, 74, 74a, c, h  
 Ekwon River region, Silurian: Whiteaves, 04  
 Eramosa beds: Williams (M Y), 15a  
 Guelph: Whiteaves, 84, 95  
 Hamilton area: Grant (C C), 05  
 Hamilton fauna: Billings, 57b; Whiteaves, 89, 98  
 Kingston area: Wilson (A E), 16  
 Niagaran fauna: Spencer (J W), 84  
 Oriskany sandstone: Stauffer, 12

## Invertebrata (general)—Continued.

- Ontario: Ottawa, River region: Salter, 52a  
 Paleozoic: Nicholson, 75  
 Patricia, Silurian: Parks (W A), 15  
 Pembroke area: Ami, 07  
 Silurian: Billings, 56d, 74a; Nicholson, 74b  
 Toronto, Ordovician: Smith (J F jr), 59  
 Wolfe Island, Trenton: Mather, 17b  
 Ordovician: Conrad, 42a  
 bibliographic index: Bassler (R S), 15a  
 Pacific coast: White (C A), 89a  
 Paleozoic: Billings, 71a; Foerste, 88; McChesney 59, 61; Meek, 65j, 66c; Miller (S A), 82e, 95a, 96c, 97; errata and corrigenda: Whiteaves, 06d  
 Arctic regions: Haughton, 60  
 Mississippi Valley: Meek, 70; Miller (S A), 96  
 Northwest, list: Bierbauer, 91  
 Panama, Gatun: Toulou, 09  
 Park City formation phosphate beds fauna: Girty, 10  
 Pembroke area, Ont. and Que.: Ami, 07  
 Pennsylvania, Allegheny and Conemaugh faunas: Raymond (P E), 10c  
 Altoona section, Devonian: Kindle, 06a  
 Coal Measures: Conrad, 35a  
 Wilkes-Barre: Claypole, 86  
 Wyoming Valley, Carboniferous: Heilprin, 86  
 Photographing Ammonites: Böse, 07a  
 Potsdam fauna, upper Mississippi Valley: Hall, 63j  
 Quebec, Anticosti: Billings, 66  
 Calciferous: Billings, 59c, 61a  
 Chazy: Billings, 59e  
 Little Metis: Dawson (J W), 96  
 Magdalen Islands: Beede, 11  
 Pembroke area: Ami, 07  
 Point Levi: Billings, 60e  
 Quebec group: Nicholson, 73  
 Red beds of Oklahoma and Texas: Beede, 07  
 Richmond fauna, Little Bay de Noquette, Michigan: Foerste, 17c  
 Richmond fossils: Foerste, 17b  
 Rockford shales, Iowa: Webster, 88c  
 Rocky Mountains region: Meek, 70c  
 Rogers Gap fauna, Ky.: Foerste, 14  
 Ste. Genevieve fauna, Monroe Co., Ill.: Weller, 16a  
 St. John group: Matthew (G F), 92, 93a, 94; Paradoxides beds: Matthew (G F), 97  
 St. Peter sandstone: Sardeson, 96a  
 Salem limestone, Indiana: Cumings, 06  
 San Pablo fauna, Cal.: Clark (B L), 15  
 Santo Domingo: Maury, 17  
 Saskatchewan, Cretaceous: Meek, 59  
 Silurian: Conrad, 42a; Ulrich, 86  
 bibliographic index: Bassler (R S), 15a  
 Port Jervis, N. Y.: Barrett (S T), 78  
 Sooke fauna, Vancouver Island: Merriam, 99a  
 South Carolina: Tuomey, 48  
 Eocene: Ravenel, 44  
 Pliocene: Tuomey, 57  
 post-Pliocene: Holmes (F S), 60  
 South Dakota, Black Hills region: Meek, 58b; Whitfield, 77, 80  
 Spergen Hill fauna: Whitfield, 82



**Invertebrata (general)—Continued.**

- Stromatoporoids and Eozoon: Kirkpatrick (R), 12, 12a
- Tennessee, Clinton: Foerste, 89a; Davidson Co.: Troost, 35c
- Silurian: Foerste, 09b; Roemer, 60
- Tertiary: Conrad, 55b, 57a; Gabb, 60b; Meek, 71f
- Atlantic coast province: Brown (T C), 07a
- Carolinas: Conrad, 41a
- upper Missouri country: Meek, 76
- Virginia and North Carolina: Conrad, 43a
- West Indies: Guppy, 74
- Texas, Caprina limestone beds: Hill (R T), 93b
- Cretaceous: Cragin, 93; Giebel, 53; Hill (R T), 89, 89a; Roemer, 52, 88
- Guadalupe Mountains: Shumard (B F), 58d, 59a
- Malone fauna: Cragin, 05
- Permian: Leuchs, 08; White (C A), 89d
- Trinity beds: Hill (R T), 93a
- Tracks: Dawson (J W), 90b
- Trenton: Walcott, 76
- Triassic, Connecticut Valley: Lull, 15
- marine: Smith (J P), 14
- Trinidad, Miocene, Springvale: Guppy, 10, 11a
- Tertiary: Maury, 12
- Tully limestone, dwarf fauna, New York: Loomis, 03
- Types in the U. S. National Museum: Schuchert, 05
- Upper Cambrian: Walcott, 90e
- Upper Helderberg fossils: Hall, 62
- Upper Missouri: Meek, 65a
- Utica, Murray River, Que.: Ami, 88a
- Utica slate fauna: Walcott, 83a
- Vermont: Billings, 61d
- Addison Co.: Seely, 10
- Cambrian: Whitfield, 84
- Fort Cassin beds: Whitfield, 97a
- St. Albans: Edson, 06a
- Vicksburg fauna: Conrad, 47
- Virginia, Miocene: Meyer (O), 88
- Triassic: Gabb, 60a
- Walker Mountain, Bays fauna: Grabau, 13b
- Washington, Olympic Peninsula: Reagan, 09
- Waverly fauna, Ohio: Cooper (W F), 90; Her-  
rick, 91; list: Cooper (W F), 88
- West Indies, Tertiary: Guppy, 67
- West Virginia: Meek, 71h
- Boone Co.: Price (W A), 15a
- Kanawha Co.: Price (W A), 14
- Preston Co.: Price (W A), 14a
- Raleigh Co., Carboniferous: Price (W A), 16a
- Western States: Meek, 70d; White (C A), 74, 77
- Wewoka fauna, Okla.: Girty, 15
- Wisconsin: Hall, 62k
- Cambrian and Ordovician: Whitfield, 78
- Devonian: Cleland, 11; Monroe, 99
- lead region: Conrad, 43b
- Niagaran: Hall, 60e, 71a
- Ordovician and Silurian: Hall, 61c
- Paleozoic: Whitfield, 80a, 82a
- Trenton: Whitfield, 95
- types of Paleozoic fossils: Teller, 11
- Wyoming, Embar formation: Branson, 16
- Jurassic, Freezeout Hills: Logan, 00a

**Invertebrata (general)—Continued.**

- Yellowstone National Park: Girty, 99a; Stan-  
ton, 99; Walcott, 99
- Iodyrite from Tonopah: Kraus, 09
- Iola quadrangle, Kans.: Adams (G I), 04c
- Ione formation, Cal.: Dickerson, 14g
- Iowa.
- Bibliography: Keyes, 93c, 13b
- Biopalla: Wallace (S J), 78
- Black Hawk Co.: Arey, 06
- Bremer Co.: Norton, 06
- Butler Co.: Arey, 10
- Chert, Montgomery Co.: Calvin, 88c
- Clayton Co.: Leonard, 06
- Copper in the drift: Fulton (A R), 84
- Davis Co.: Arey, 10c
- Elk Point quadrangle: Todd, 08
- Fireclay pockets in Niagara limestone at Clin-  
ton: Farnsworth, 88
- Franklin Co.: Williams (I A), 06
- Fremont Co.: Call, 80
- General: Calvin, 92e, 98c, 01a; Farnsworth, 83
- Geologic history: Calvin, 98d
- Geological survey: Calvin, 09c; Hall, 60h
- Keyes, 97h, 03p
- cost: Call, 91c
- reports: Calvin, 93c; Kay, 12, 14b, c, 16a, 17;  
Savage, 06; White (C A), 67, 68; Wilder,  
05
- work and scope: Keyes, 94m, 95
- Grundy Co.: Arey, 10a
- Hamilton and Wright cos.: MacBride, 10
- Harrison and Monona cos.: Shimek, 10
- History of geology in Iowa: Arey, 12
- Iowa Co.: Stookey, 10
- Jackson Co.: Savage, 06a
- Mapping of State: Keyes, 94n
- Muscatine Co.: Witter, 79
- Northeastern Iowa: Trowbridge, 14a
- Poweshiek Co.: Stookey, 10a
- Sac and Ida cos.: MacBride, 06
- Soils, genesis: Calvin, 95d; geology: McGee, 81a
- Wayne Co.: Arey, 10b
- Winneshiek Co.: Calvin, 06
- Economic geology.**
- Allamakee Co.: Calvin, 95a
- Appanoose Co.: Bain, 96c
- Benton Co.: Savage, 05a
- Black Hawk Co.: Arey, 06
- Boone Co.: Beyer, 96
- Bremer Co.: Norton, 06
- Buchanan Co.: Calvin, 98a
- Buena Vista Co.: MacBride, 02
- Building stone: Bain, 95, 95i, 98c; Hawes, 84;  
Knight (N), 01a
- Carroll Co.: Bain, 99a
- Cedar Co.: Norton, 01
- Cedar Valley quarry: Calvin, 96d
- Cement materials: Bain, 05; Beyer, 06, 07a, b;  
Burchard, 07h; Eckel, 05i, 13; Lonsdale,  
95a; Dubuque: Burchard, 07b
- Cerro Gordo Co.: Calvin, 97a
- Cherokee Co.: MacBride, 02
- Chickasaw Co.: Calvin, 03a
- Chippewa land district: Owen (D D), 48
- Clay: Beyer, 04a; Warren Co.: Youtz, 96
- Clay Co.: MacBride, 01



## Iowa—Continued.

*Economic geology—Continued.*

Clayton Co.: Leonard, 06  
 Clinton Co.: Udden (Jon A), 05  
 Coal: Bain, 95h, 02a; Hinds, 09, 10; Hinrichs, 68; Keyes, 93i, n, 94; Savage, 05d; White (C A), 70b; Wilder, 09  
 analyses: Hixson, 14; Lees, 09c  
 bibliography: Lees, 09a  
 Dallas Co.: Leonard, 98  
 Des Moines Valley: Worthen, 53  
 fuel values: Wilder, 09  
 Guthrie Co.: Bain, 97c  
 Jasper Co.: Williams (I A), 05  
 Mahaska Co.: Bain, 95d  
 Marion Co.: Miller (B L), 01  
 Middle River region: Tilton, 95  
 Monroe Co.: Beyer, 03  
 Mystic basin: Bain, 94, 94a  
 Polk Co.: Bain, 97b; Davis (F), 95  
 Raccoon River region: St. John, 68a  
 southwestern Iowa: Keyes, 02f  
 tests: Savage, 05d  
 Wapello Co.: Leonard, 02  
 Coal Measures: Keyes, 94h  
 Dallas Co.: Leonard, 98  
 Davis Co.: Arey, 10c  
 Decatur Co.: Bain, 98a  
 Delaware Co.: Calvin, 98  
 Des Moines Co.: Keyes, 95d  
 Dickinson Co.: MacBride, 00  
 Dolomites: Calvin, 95c  
 Dubuque Co.: Calvin, 00  
 Eastern Iowa: Owen (D D), 40  
 Economic map: Parker (N H), 56  
 Fayette Co.: Savage, 05b  
 Franklin Co.: Williams (I A), 06  
 Fuller's earth: Cook (A N), 04  
 Galena quadrangle: Shaw (E W), 16  
 General: Calvin, 98c, 01b; Hall, 58; Hinrichs, 67, 68; Owen (D D), 47, 52; White (C A), 67, 68, 70, 70c  
 Glass sand deposits: Burchard, 07d  
 Guthrie Co.: Bain, 97c  
 Gypsum: Keyes, 93p, 95b; 96m, 03p; Wilder, 02, 04a  
 age and origin: Wilder, 03  
 Centerville, Appanoose Co.: Kay, 14  
 Fort Dodge, Miocene age: Keyes, 15j  
 Hamilton Co.: MacBride, 10  
 Hardin Co.: Beyer, 00  
 Henry Co.: Savage, 02  
 Howard Co.: Calvin, 03  
 Humboldt Co.: MacBride, 99  
 Ida Co.: MacBride, 06  
 Iron, Allamakee Co.: Beyer, 02, Orr, 88; Waukon: Howell (J V), 16  
 Jackson Co.: Savage, 06a  
 Jasper Co.: Williams (I A), 05  
 Jefferson Co.: Udden, 02  
 Johnson Co.: Calvin, 97  
 Jones Co.: Calvin, 96  
 Keokuk Co.: Bain, 95c  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
 Lead: Davis (R E), 06  
 Clayton Co.: Leonard, 06

## Iowa—Continued.

*Economic geology—Continued.*

Lead: Dubuque: Bain, 99b, 06; Jackson, 63a; Leonard, 96a, c, 97  
 Lancaster quadrangle: Grant (U S), 07  
 Lansing, Allamakee Co.: Leonard, 95a  
 Lead and zinc deposits: Bain, 06; Cox (G H), 11; Davis (R E), 06; Leonard, 96b  
 Dubuque Co.: Calvin, 00  
 origin: Leonard, 95  
 Lee Co.: Keyes, 95c  
 Limes: Beyer, 07  
 Limestone: Beyer, 07b  
 Linn Co.: Norton, 95b  
 Lithographic stone, Floyd Co.: Webster 15; Mitchell Co.: Hoen, 03  
 Louisa Co.: Udden, 01  
 Lyon Co.: Wilder, 00  
 Madison Co.: Tilton, 97  
 Mahaska Co.: Bain, 95d  
 Marion Co.: Miller (B L), 01  
 Marshall Co.: Beyer, 97a  
 Mineral production: Beyer, 99a; Kay (G F), 14d, 16b, 17a  
 Mineral resources: White (C A), 70c  
 Mitchell Co.: Calvin, 03b  
 Monroe Co.: Beyer, 03  
 Montgomery Co.: Lonsdale, 95  
 Muscatine Co.: Udden, 99  
 Natural gas: Keyes, 92f; in drift, Leonard, 97a; Letts: Witter, 92  
 Niagara lime and building stones: Houser, 93  
 O'Brien Co.: MacBride, 01  
 Osceola Co.: MacBride, 00  
 Page Co.: Calvin, 01  
 Peat: Beyer, 09; Savage, 05c  
 bibliography: Lees, 09b  
 pre-Kansan bed: MacBride, 97  
 Union Co.: Savage, 04  
 Plymouth Co.: Bain, 98b  
 Polk Co.: Bain, 97b  
 Pottawatamie Co.: Udden, 01a  
 Quarry products: Beyer, 07b  
 Raccoon River region: St. John, 68a  
 Road and concrete materials: Beyer, 14  
 Sac Co.: MacBride, 06  
 Sandstone: Beyer, 07b  
 Scott Co.: Norton, 99  
 Sioux Co.: Wilder, 00  
 Story Co.: Beyer, 99b  
 Van Buren Co.: Gordon (C H), 95a  
 Wapello Co.: Leonard, 02  
 Warren Co.: Tilton, 96  
 Washington Co.: Bain, 96a  
 Wayne Co.: Arey, 10b  
 Webster: Wilder, 02  
 Winneshiek Co.: Calvin, 06  
 Woodbury Co.: Bain, 96b  
 Worth Co.: Williams (I A), 00  
 Zinc: Bain, 06; Davis (R E), 06  
 Dubuque: Bain, 99b; Leonard, 96a, c, 97  
 Lancaster quadrangle: Grant (U S), 07  
 northeastern Iowa: Leonard, 94  
*Historical geology.*  
 Alexandrian series: Savage, 14a  
 Allamakee Co.: Calvin, 95a; Waukon area: Howell (J V), 16



**Iowa—Continued.***Historical geology—Continued.*

- Appanoose Co.: Bain, 96c  
 Benton Co.: Savage, 05a  
 Bethany limestone: Tilton, 13b  
 Black Hawk Co.: Arey, 06  
 Boone Co.: Beyer, 96  
 Boring, Bedford: Kay, 14b  
   Burlington: Fultz, 99  
   Cedar Rapids: Norton, 95d  
   Davenport: Tiffany, 89  
   Emmetsburg: Winchell (N H), 80c  
   Glenwood: Call, 92  
   Grinnell: Jones (A J), 95  
   Jackson Co.: Reid (H), 11  
   Pestville: Calvin, 96c  
   Sigourney, Keokuk Co.: Bain, 94b  
   southeastern Iowa: Gordon (C H), 89  
   Washington: Calvin, 88a  
 Bremer Co.: Norton, 06  
 Buchanan Co.: Calvin, 92c, 98a  
 Buena Vista Co.: MacBride, 02  
 Burlington limestone: Fultz, 94; Keyes, 89f;  
   Niles, 66, 66a; White (C A), 60; erosion  
   during deposition: Fultz, 95; interrupted  
   deposition: Fultz, 94a  
 Butler Co.: Arey, 10  
 Cap-au-Grés fault: Keyes, 17j  
 Carboniferous: Keyes, 98e; St. John, 70a;  
   Smith (G L), 15; Tilton, 13b  
   base: Keyes, 12f  
   central Iowa: Keyes, 91  
   Humboldt: Sardeson, 02a  
   Jackson Co.: Osborn (H), 92  
   Page Co.: Keyes, 01  
   southwestern Iowa: Lonsdale, 95b; Smith  
   (G L), 09; Todd, 90b  
 Carboniferous terranes, correlation: Keyes, 14e  
 Carroll Co.: Bain, 99a  
 Cedar Co.: Norton, 01  
 Cedar Valley beds, Floyd Co.: Fenton, 18  
 Cedar Valley quarry: Calvin, 96d  
 Cedar Valley-Lime Creek unconformity:  
   Thomas (A O), 12  
 Cerro Gordo Co.: Calvin, 97a  
 "Chemung," Burlington: White (C A), 62  
 Cherokee Co.: MacBride, 02  
 Chickasaw Co.: Calvin, 03a  
 Chippewa land district: Owen (D D), 48  
 Chouteau limestone, terranal affinities: Keyes,  
   16e  
 Clay Co.: MacBride, 01  
 Clayton Co.: Leonard, 06  
 Clinton Co.: Udden (Jon A), 05  
 Clinton formation, Dubuque Co.: Howell (J V)  
   16a.  
 Coal cos.: White (C A), 70b  
 Coal Measures: Keyes, 94h; Des Moines: Keyes,  
   88b; unconformity at base: White (C A),  
   68c  
 Cretaceous: Calvin, 93; Keyes, 92h, 13; Lons-  
   dale, 94; White (C A), 73, 88a  
   eastern limit: White (C A), 73  
   Guthrie Co.: White (C A), 69b  
   northwestern Iowa: Keyes, 94i  
   sequence: Keyes, 13j  
   Sioux Valley: Bain, 95a  
   Woodbury and Plymouth cos.: Calvin, 93d

**Iowa—Continued.***Historical geology—Continued.*

- Dallas Co.: Leonard, 98  
 Davenport: Barris, 80, 82, 89, 00; Pratt (W H),  
   76, 82a  
 Davis Co.: Arey, 10c  
 Decatur Co.: Bain, 98a  
 Delaware Co.: Calvin, 98  
 Des Moines Co.: Fultz, 96a; Keyes, 95d  
 Des Moines region: Keyes, 88d, 91d  
 Des Moines series: Keyes, 97e  
 Des Moines stage, general section: Lees, 09  
 Des Moines Valley: Worthen, 58  
 Devonian: Keyes, 13q; Norton, 94; Thomas  
   (A O), 13; Webster, 89  
   Buchanan Co.: Calvin, 91  
   succession: Keyes, 13k  
 Devonian and Carboniferous outliers, eastern  
   Iowa; Norton, 95  
 Devonian-Carboniferous unconformity: Keyes,  
   13e  
 Diatomaceous deposit, Muscatine Co.: Myers,  
   99; Udden, 99d  
 Dickinson Co.: MacBride, 00  
 Dolomites: Calvin, 95c  
 Dubuque Co.: Calvin, 00  
 East Davenport: Pratt (W H), 82  
 Eastern Iowa: Owen (D D), 40  
 Elk Point quadrangle: Todd, 08  
 Emmet Co.: MacBride, 05  
 Fayette Co.: Savage, 05b  
 Flint beds in Burlington limestone: Fultz, 95h  
 Ford-Winterset: Tilton, 93  
 Franklin Co.: Williams (I A), 06  
 Fremont Co.: Call, 80; Udden, 03  
 Friable sandstone: Calvin, 94a  
 Galena quadrangle: Shaw (E W), 16  
 Galena series: Sardeson, 07  
 General: Bain, 04i; Beyer, 06a, 07b; Calvin, 85,  
   93c, 01b, 02a, 06a; Hall, 58; Hinrichs, 67;  
   Keyes, 94a, 95, 14d; Norton, 98, 12; Owen  
   (D D), 47, 51, 52, 52f; St. John, 68; Todd,  
   06; White (C A), 67, 68, 70  
 Geologic formations: Keyes, 93a  
 Geologic map: Iowa G S, 14; Keyes, 94a; Sav-  
   age, 06b  
 Geologic section: Calvin, 06a; subdivisions:  
   Keyes, 12e  
 Graf section: Thomas (A O), 14  
 Grundy Co.: Arey 10a  
 Guthrie Co.: Bain, 97c  
 Gypsum region: Keyes, 95b  
 Gypsum deposits: Keyes, 93p, 02c  
 Hamilton Co.: MacBride, 10  
 Hancock Co.: MacBride, 03  
 Hardin Co.: Beyer, 00  
 Harrison Co.: Shimek, 10  
 Henry Co.: Savage, 02  
 Howard Co.: Calvin, 03  
 Humboldt Co.: MacBride, 99  
 Ida Co.: MacBride, 06  
 Independence shale: Calvin, 78  
 Iowa City sandstones, age: Keyes, 92g  
 Iowa Co.: Stookey, 10  
 Jackson Co.: Savage, 06a  
 Jasper Co.: Williams (I A), 05  
 Jefferson Co.: Udden, 02



## Iowa—Continued.

*Historical geology*—Continued.

- Johnson Co.: Calvin, 97; geologic history: Calvin, 85a  
 Jones Co.: Calvin, 96  
 Keokuk beds, Keokuk: Gordon (C H), 90a, d, 91, 92  
 Keokuk Co.: Bain, 95c  
 Kinderhook beds, Burlington: Weller, 00b, d  
 Kossuth Co.: MacBride, 03  
 Lancaster and Mineral Point quadrangles Grant (U S), 07  
 Lava flows, northwestern Iowa: Beyer, 93  
 Leclaire limestone: Calvin, 96a; Worthen, 62  
 Lee Co.: Keyes, 95c  
 Lime Creek beds: Williams (H S), 83a  
 Linn Co.: Norton, 95b  
 Louisa Co.: Udden, 01  
 Lyon Co.: Wilder, 00  
 Madison Co.: Brown (F A), 06; Tilton, 97  
 Magnesian series: Hall (C W), 95  
 Mahaska Co.: Bain, 95d  
 Map of drift sheets: Iowa G S, 14a  
 Maquoketa shales: James (J F), 89b, 90e; Delaware Co.: Calvin, 95b  
 Marion Co.: Miller (B L), 01  
 Marshall Co.: Beyer, 97a  
 Middle River section: Tilton, 95  
 Mills Co.: Udden, 03  
 Mississippi Valley, Savanna-Davenport: Carman, 09  
 Mississippian series: Bain, 95g; Hall, 57d  
 Missouri Valley: Shimek, 11a  
 Missourian section: Keyes, 98g  
 Mitchell Co.: Calvin, 03b  
 Monona Co.: Shimek, 10  
 Monroe Co.: Beyer, 03  
 Montgomery Co.: Lonsdale, 95  
 Muscatine Co.: Calvin, 88d; Udden, 99; Witter, 79; Wyoming Hills: Witter, 79a  
 Mystic coal basin: Bain, 94, 94a  
 Northern Iowa: White (C A), 70b  
 Northwestern Iowa: Todd, 92c; White (C A), 70b  
 O'Brien Co.: MacBride, 01  
 Oelwein section: Beyer, 97b  
 Osceola Co.: MacBride, 00  
 Page Co.: Calvin, 01  
 Paleozoic formations: Beyer, 07b; northeastern Iowa: Norton, 95a  
 Palo Alto Co.: MacBride, 05  
 Pella limestone: Udden, 02b; Weller, 15a  
 Pine Creek conglomerate: Udden, 99e  
 Plymouth Co.: Bain, 98b  
 Pocahontas Co.: MacBride, 05  
 Polk Co.: Bain, 97b  
 Pottawatamie Co.: Udden, 01a  
 Poweshiek Co.: Stookey, 10a; Coal Measures: Jones (A J), 94  
 Prairiedu Chien-St. Peter unconformity: Trowbridge, 17b  
 Pre-Cambrian: Keyes, 14f, 1  
 Raccoon River region: St. John, 68a  
 Red quartzite boulders: White (C A), 69c  
 Redrock sandstone, Marion Co.: Keyes, 91c  
 Rockford shales: Webster, 88a, 89c  
 Sac Co.: MacBride, 06

## Iowa—Continued.

*Historical geology*—Continued.

- Ste. Genevieve, southeastern Iowa: Weller, 15a  
 Saint Louis limestone: Gordon (C H), 95c  
 brecciated character: Gordon (C H), 90b  
 Mahaska Co.: Bain, 93  
 Poweshiek Co.: Jones (A J), 93  
 Salem limestone: Van Tuyl, 12  
 Scott Co.: Norton, 99; Tiffany, 85  
 Silurian, northeastern Iowa: Wilson (A G), 95  
 Sioux Co.: Wilder, 00  
 Sioux Falls region: Shimek, 12a  
 Sioux quartzite: Beyer, 97; Keyes, 93h, o, 14l; age: Keyes, 95r  
 Southeastern Iowa: Gordon (C H), 95; Smith (G L), 16; White (C A), 67d, 70a  
 State quarry limestone, Johnson Co.: Calvin, 97b  
 Story Co.: Beyer, 99b  
 Sweetland Creek beds: Udden, 99a, 12a  
 Table of formations: Keyes, 14b, 15c, n  
 Tama Co.: Savage, 03  
 Terrace, age, Des Moines region: Tilton, 15  
 Tertiary beds: Keyes, 13p  
 Tertiary Riverside sands: Keyes, 13l  
 Unconformity at base of Coal Measures: Keyes, 93g  
 Union Co., Dodge township: Savage, 04  
 Van Buren Co.: Gordon (C H), 95a  
 Wapello Co.: Leonard, 02  
 Wapsipinicon River, section: Calvin, 91a  
 Warren Co.: Tilton, 96, 11  
 Warsaw formation: Gordon (C H), 95c  
 Washington Co.: Bain, 96a  
 Water-lime group: Tiffany, 83  
 Wayne Co.: Arey, 10b  
 Webster Co.: Wilder, 02, 03  
 Western Iowa: St. John, 70  
 Winnebago Co.: MacBride, 03  
 Winneshiek Co.: Calvin, 06  
 Woodbury Co.: Bain, 96b  
 Worth Co.: Williams (I A), 00  
 Wright Co.: MacBride, 10

*Mineralogy.*

- Catalog of minerals: Hinrichs, 68; Keyes, 93b  
 General: Keyes, 93k  
 Geodes, Keokuk: Wallace (S J), 78  
 Meteorite: Smith (J L), 75c; Torrey, 91  
 Amana, Iowa Co.: Leonard, 75; Hinrichs, 05; Prior, 18  
 Estherville, Emmet Co.: Rath, 80; Shepard, 79; Smith (J L), 80  
 Leland, Winnebago Co.: Kunz, 90, 90e, f  
 Linn Co.: Shepard, 51b, c, 52e  
 Millerite, Keokuk beds: Haworth, 86; Keyes, 92e, 93f  
 Quenstedtite, Montpelier: Kuntze, 99  
 Satin spar, Dubuque: Leonard, 94  
 Webster Co.: Spencer (A C), 95a

*Paleontology.*

- Aftonian mammalian fauna: Calvin, 09b, 10, 11; Thomas (A O), 12a  
 Agaricocrinus, Keokuk: Gordon (C H), 90  
 Atrypa reticularis: Thomas (A O), 16  
 Blastoidea: Meek, 69b; Devonian: Barris, 84  
 Brachiopoda, Devonian: Webster, 88d



## Iowa—Continued.

*Paleontology*—Continued.

- Burlington: White (C A), 60, 63; Crinoidea: Meek, 69c; Wachsmuth, 78
- Burrowing sponge: Thomas (A O), 11
- Cactocrinus: Wood (Elvira), 14
- Camptothecium, Kansan drift: Grout (A J), 17
- Carboniferous: Meek, 60d, 61b; Smith (G L), 15; White (C A), 62a, 67c
- Des Moines: Keyes, 97
- Echinodermata: Miller (S A), 89b, 90
- fishes: Eastman, 03a
- Invertebrata: Worthen, 84
- plants: MacBride, 96
- sharks: Eastman, 02
- Cardiocarpus: Jones (A J), 94a
- Caribou, Muscatine: Leidy, 79
- Cephalopoda, Coal Measures: Keyes, 96p; Niagaran: Thomas (A O), 15a
- Cerionites: Calvin, 93a
- Chalk, composition and origin: Calvin, 95
- "Chemung," Burlington: White (C A), 62
- Chemung fossils, Burlington: Winchell (A), 63a
- Coal Measures fauna: Keyes, 88d, 91d, 92i; Des Moines: Keyes, 88a
- Coelacanth fish, Kinderhook: Eastman, 08
- Concretions, fossiliferous, Marion Co.: Spencer (A C), 94
- Conocardium, Devonian, Iowa: Keyes, 92j
- Conularia, Carboniferous: Emmons (E), 46g
- Cretaceous: White (C A), 67e, 88a; flora, western Iowa: Bartsch, 96
- Crinoidea: Owen (D D), 50; Springer, 11a
- Carboniferous: Hall, 61d, e; Meek, 65h; Miller (S A), 90b; Worthen, 82
- Mississippian: Hall, 59j; Meek, 68e; Miller (S A), 96a, b; Owen (D D), 52c
- Monticello: Thomas (A O), 15
- Crinoidea and Blastoidea, Mississippian, Le Grand: Wachsmuth, 90
- Crustacean, decapod: Whitfield, 92b
- Ctenacanthus, Keokuk: Eastman, 97a
- Cupressinoxylon: Knowlton, 88a
- Cyathophyllum, Jones Co.: Thomas (A O), 17
- Davenport: Barris, 80a
- Devonian: Hall, 73; White (C A), 62a; Williams (H S), 89
- fish fauna: Eastman, 97c, 03c, 08a
- Mollusca: Keyes, 88e
- Devonian and Silurian fossils: Haines, 10
- Dictyoretmon, Burlington: Whitfield, 04
- Dipterus, Devonian: Udden, 99b
- Edestus: Hay (O P), 12c
- Elephas, Grinnell: Barbour (E H), 90b
- Exogenous leaves, Cretaceous: White (C A), 67e
- Floyda, Hackberry group: Webster, 05
- Foraminiferal ooze, Coal Measures: Udden, 03a
- Gastropoda, Burlington: Keyes, 89f
- Hackberry group: Webster, 05b, 09
- new species: Webster, 06
- General: Hall, 58
- Halysites, Jackson Co.: Whitfield, 03a
- Hamilton fossils: Hall, 60b
- Heteracanthus, Buffalo: Lindahl, 97
- Independence shale: Calvin, 78

## Iowa—Continued.

*Paleontology*—Continued.

- Invertebrata: Meek, 66d; White (C A), 67b
- Kinderhook faunas, Burlington: Weller, 00b, d, 01a
- Lepidostrobos, Warren Co.: Coulter, 11; Tilton, 12
- Lime Creek fauna: Calvin, 83
- Loess fossils: Call, 81; Keyes, 88, 89d; Shimek, 88, 90, 98, 99, 01; distribution: Shimek, 99
- Lower Magnesian fauna: Calvin, 92d
- Macgeea, Devonian coral: Webster, 89b
- Mammoth: Parker (H W), 84; Washington Co.: Gass, 82
- Mastodon and mammoth, distribution: Anderson (N C), 05
- Mississippian Crinoidea: Owen (D D), 52b
- Echinodermata: Meek, 69a
- Niagaran corals: Thomas (A O), 16a
- Nileus vigilans, Elgin: Finch (G E), 04
- Orthoceras, Carboniferous, Iowa: Keyes, 96l
- Ovibos, from loess: McGee, 87; Harrison Co.: Leidy, 70k
- Pachyphyllum: Webster, 89a, 05c
- Palaeopalaemon iowensis, Kinderhook shale, Burlington: Walter, 17
- Paleozoic: Calvin, 90a; McChesney, 67; Meek, 66c; Miller (S A), 93; White (C A), 76a; list: Bierbauer, 91
- Pella beds: Udden, 02b
- Phillipsastrea: Calvin, 93b
- Pisces: Newberry, 78d
- Plant remains: MacBride, 07
- Pleistocene Mammalia: Hay (O P), 14
- Pleuroptyx, Coal Measures: Udden, 02c
- Poteriocrinus, Burlington: Whitfield, 81
- Proboscidea, Pleistocene, occurrence: Udden, 05
- Psaronius: Farr, 14
- Pseudorthoceras knoxense, apical end, Des Moines: Girty, 16
- Quaternary Vertebrata, western Iowa: Calvin, 09d
- Rockford shales: Webster, 88a, c
- Scott Co.: Tiffany, 85
- Shark's tooth, Keokuk: Desor, 50
- Sigillaria, Keokuk limestone, Iowa: Gordon (C H), 90c
- Silurian fauna, Jones Co.: Weller, 96
- Spirifer, Devonian: Calvin, 92b
- Spirifer parryana: Calvin, 88e
- Spirifer urbana, Hamilton group: Calvin, 88f
- Straparollus: Keyes, 90
- Taxocrinus, Buffalo: Meek, 65f
- Trilobites, Maquoketa beds, Fayette Co.: Slocum, 13, 16
- Tubicolar annelid: Calvin, 88
- Westerna, Hackberry group, Iowa: Webster, 05a
- Wood, fossil, Keokuk: Wallace (S J), 78a
- Petrology.*
- Dolomites: Knight (N), 01, 04, 04a, 14
- Geodes, Keokuk beds: Van Tuyl, 16f
- Lava flows, northwestern Iowa: Beyer, 93
- Mount Vernon loess, analysis: Knight (N), 02
- Oolite, Clayton Co.: Van Tuyl, 16d
- structure: Barbour, 90a
- Sioux quartzite: Beyer, 97



## Iowa—Continued.

*Physical geology.*

- Alluvial changes, recent: Todd, 07  
 Chalk, composition and origin: Calvin, 95  
 Coal beds, structural features: Bain, 95e  
 Dolomite, decomposition: Knight (N), 08  
 Earthquake, Iowa City, April 9: Kay (G F), 17d  
 Fault systems: Keyes, 16d  
 Faulting: Keyes, 15p  
 Fracture systems: Hobbs, 05  
 Granitic masses, surface disintegration: Keyes, 93l  
 Leaching of Pleistocene drifts: Leighton, 15  
 Loess with horizontal shearing planes: Udden, 02a  
 Mud-crack limestone, Devonian: Fenton, 18  
 Post-Kansan erosion: Leighton, 17  
 Quartzites, formation: Keyes, 94k

*Physiographic geology.*

- Aftonian and pre-Kansan, southwestern Iowa: Bain, 98e  
 Aftonian gravels: Calvin, 05; Shimek, 08b, 09, 10b  
 Arikaree, glacial lake: Todd, 92b  
 Boone Co.: Beyer, 96  
 Buchanan gravels: Calvin, 96b; Leighton, 17a  
 Buried river channels, southeastern Iowa: Gordon (C H), 95  
 Camp Dodge region: Lees, 18, 18a  
 Carboniferous drift, East Davenport: McWhorter, 82  
 Cerro Gordo Co.: Calvin, 97a  
 Cretaceous drift pebbles, northern Iowa: Udden, 99c  
 Delaware Co.: Calvin, 96e  
 Des Moines Valley: Lees, 16  
 Drainage, southeastern Iowa: Fultz, 95c  
 Drainage and loess distribution: Gilbert, 83c  
 Drainage changes: Lees, 14; eastern Iowa: Leverett, 92c  
 Drainage system: McGee, 84  
 Drift deposits: Todd, 81; White (C A), 68b  
   Cedar Rapids region: Shipton, 14  
   constituents: Webster, 05d  
   northeastern Iowa: McGee, 78  
   northern Iowa: Webster, 90  
   northwestern Iowa: Bain, 99  
   Oelwein: Finch (G E), 97  
   southwestern Iowa: Gow, 13; Todd, 80; White (C A), 67a  
   subdivisions: Calvin, 97c  
   Tama Co.: Savage, 01  
 Drift exposures: Orr, 07  
 Drift sheets, map: Bain, 98d  
 Driftless Area: Calvin, 95e  
 Eastern Iowa: Calvin, 99a; McGee, 84  
 Extra-morainic till, origin: Todd, 90  
 Frozen streams of the Iowa drift border: Wilson (A G), 96  
 Galena quadrangle: Shaw (E W), 16  
 General: Bain, 04i; Call, 91b; Calvin, 03c; Hall, 58; Lees, 14, 17; White (C A), 70  
 Glacial drift on residuary clay: McGee, 79  
 Glacial scorings: Keyes, 95a; southeastern Iowa: Fultz, 95e, 96  
 Glacial striae; Norton, 11  
 Glacial succession: Calvin, 97e

## Iowa—Continued.

*Physiographic geology—Continued.*

- Glaciation: Irish, 85; McGee, 79b; Webster, 87  
 Des Moines Valley: Lees, 16  
 Keokuk: Gordon (C H), 91  
 Lamoni: Fitzpatrick, 98  
 northeastern Iowa: McGee, 79a  
 north central Iowa: Webster, 88b  
 post-Kansan, Iowa City; Leighton, 13  
 Hardin Co.: Beyer, 00  
 Howard Co.: Calvin, 02, 03  
 Ice ages: Keyes, 14h  
 Illinois lobe of ice sheet: Fultz, 95d  
 Interglacial deposits, northeastern Iowa: Calvin, 98b  
 Interloessial till, Sioux City: Todd, 95a  
 Iowan drift: Alden, 17; Calvin, 99, 11a; Kay, (G F), 16c; Leighton, 17b; Ogilvie, 16  
 Johnson Co.: Calvin, 97; surface geology: Webster, 88  
 Kames and asar: McGee, 80a  
 Kansan and sub-Aftonian drift, Clinton Co.: Leighton, 16a  
 Kansan drift, southern Iowa: Kay (G F), 16d  
 Lake beds of prairie region: Wallace (S J), 69  
 Lakes, past and present: White (C A), 68a  
 Loess: Shimek, 90; Todd, 79  
   central Iowa: Call, 81  
   Des Moines: McGee, 82  
   eastern Iowa: McGee, 84  
   genesis: Shimek, 08c, d  
   Iowa City: Shimek, 01b  
   Muscatine: Witter, 90  
   paha and river ridge: Shimek, 08d  
   so-called: Gow, 13  
   southeastern Iowa: Leverett, 96c  
   southwestern Iowa: Willcox, 04  
   Story Co.: Beyer, 99c  
 Loess and Iowan drift: Shimek, 04b  
 Loess areas: Shimek, 99  
 Madison Co.: Tilton, 97  
 Map of drift sheets: Iowa G S, 14a  
 Mississippi channels, southeastern Iowa: Leverett, 01  
 Mississippi River channel, features of: Calvin, 07  
 Mississippi Valley, Savanna-Davenport: Carman, 09  
 Muscatine Co.: Udden, 99  
 Nebraskan drift: Shimek, 11c; Little Sioux Valley: Carman, 12a, 13  
 Northeastern Iowa: Bain, 96d; McGee, 89b, 90c  
 Ocheyedan mound, Osceola Co.: Kay (G F), 17c  
 Peneplains, Driftless Area: Hughes (U B), 16  
 Platte River, changes: Todd, 80a  
 Pleistocene: Calvin, 97f; Hay (O P), 14; Shimek, 12b  
   Capitol Hill, Des Moines: Lees, 16a  
   Council Bluffs region: Shimek, 11d  
   Crawford and Carroll cos.: Kay (G F), 17b, 18  
   Iowa River valley, Johnson Co.: Leighton, 16  
   Missouri Valley: Shimek, 10a  
   northwestern Iowa: Carman, 17  
   Simpson College well: Tilton, 10  
 Pleistocene history, northeastern Iowa: McGee, 91, 93e



## Iowa—Continued.

*Physiographic geology*—Continued.

Pleistocene problem: Calvin, 09a

Pleistocene section, Des Moines to Allerton: Tilton, 13a; south of Des Moines: Tilton, 13

Post-Kansan glaciation, Johnson Co.: Leighton, 13a

Prairies: Shimek, 11

Preglacial elevation: Bain, 95f

Preglacial river channels, central Iowa: Keyes, 07g

Preglacial soils: Udden, 98c

Pre-Kansan peat bed: MacBride, 97

Quaternary deposits, Keokuk: Gordon (C H) 92; near Des Moines: Keyes, 92m

Scott Co.: Norton, 99

Sub-Aftonian till sheet, northeastern Iowa: Beyer, 97b

Surface deposits: Shimek, 97; Burlington Keyes, 88g; western Iowa: St. John, 68a

Tama Co.: Savage, 03

Terrace, Des Moines, age: Tilton, 15a

Terrace formation, Turkey River valley, Fayette Co.: Finch (G E), 01

Toledo lobe of Iowan drift: Savage, 03a

Vegetable remains in drift: Winchell (N H), 76b

Wall lake: Wilder, 00a

Warren Co., drainage: Tilton, 94

Waukon area, Allamakee Co.: Howell (J V), 16

Wisconsin and Kansan drift sheets, central Iowa: Bain, 97a

Wisconsin drift, Des Moines region: Tilton, 15

Wisconsin drift, Polk Co.: Tilton, 14

Yarmouth interglacial epoch, duration: Kay (G F), 16e

Yarmouth weathered zone: Leverett, 98a

*Underground water.*

Artesian wells: Call, 91d, 92, 92a; Calvin, 02b; Norton, 97; Belle Plaine: Chamberlin, 86a; Mosnat, 99

General: Norton, 98, 05a, 12

Ground waters: Hendrixson, 07

Waterloo: Norton (W H), 05b

Iowan drift: Calvin, 11a

Irasburg terraines, Vt.: Richardson (C H), 12b

## Iridium.

General: Dudley, 85

United States: U S G S, 83

Iron. *See also iron-producing States.*

America: Leith, 17

Appalachian region: Lesley, 65; Prime, 75a

Appalachian interbedded ores, genesis: Earle, 13

Azoic, occurrence in: Whitney, 56

Bacteria, iron: Harder, 15

Bog ore deposits, formation and distribution: Dake, 15a

Bombshell ore, origin: Chance, 08d

Brandon period ores: Lewis (H C), 80q

Brown iron ores as cavity fillings: Eckel, 13

Canada: Coste, 88a; Lindeman, 17; Robinson (A H A), 17a

Chromic iron: Donald, 96

Clinton ore: Rogers (W B), 58a; Smyth (C H), 92a; 11a

Appalachians: Eckel, 95j

eastern United States: Smyth (C H), 94d

origin: Foerste, 91a

## Iron—Continued.

Colorado, Eagle Co., Red Cliff, manganiferous iron ore: Umpleby, 17b

Crystalline ores, genesis: Julien, 82; Newberry, 82c

Distribution: Whittlesey, 68a

eastern United States: Smock, 84

geographic and geologic: Pumpelly, 86

United States: Vogdes, 86

Eastern States: Birkinbine, 87

Eruptive iron ores: Nason, 91c

Exploration, use of geology: Leith, 12

Future of iron industry: Kemp, 12b

General: Birkinbine, 88, 88a, 93; Daddow, 66; Demaret, 02; Eckel, 14; Geijer, 15; Harder, 09c; Höfer, 78; Joseph, 16e; Kemp, 16; Lesley, 59; Newton, 75; Smith (E A), 83a

Genesis: Hunt, 80f; Singewald, 12; Sosman 17a by residual concentration: Kimball, 98

of Paleozoic interbedded deposits: Earle, 14

Hematite, frondescent: Winchell (N H), 93f; zonal growth: Sosman, 17

Hematite ores: Lyman, 68

Lake Superior region: Brinsmade, 08g; Crowell &amp; Murray, 11; Englebach, 13; Foster, 51e; Geijer, 14; Grant (U S), 02; Hurd, 11; Irving, 90; Leith, 03a, 04, 05a, 11, 11a, 14b; Snelus, 92; Spurr, 02; Van Hise, 92b, 01, 11; Whitney, 56; Winchell (H V), 98; Winchell (N H), 12a; Wright (C E), 76

Lateritic ore deposits: Miller (W G), 17a

Limonite deposition: Bowles, 11a

Magnetic iron ores: Nason, 12

Magnetite deposits of Duluth gabbro, magnetic survey of: Broderick, 18

Manganese, association with, in sedimentary rocks: Penrose, 93a

Minnesota, equivalent eastern ores: Winchell (N H), 91a

Iron, native, in coal measures, Missouri: Allen (E T), 97

New England, northern: Benton, 86a

Occurrence in Azoic: Whitney, 56

Ore deposition with special reference to the sulphides of iron: Allen (E T), 11

Ore supply: Hayes (C W), 09a

Oriskany limonites, origin: Johnson (J E), 03

Oriskany ore: Holden, 16

Oxides: Day (A L), 17

Pyritic origin of iron-ore deposits: Cabot, 08; Chance, 08b

Reserves: Eckel, 12a; Hayes (C W) 09a; Kemp, 10e; Leith, 07

Residual ores, formation and distribution: Dake, 15

Resources of the world: Adams (F D), 11

Titanic ores, microstructure: Warren (C H), 18

Titaniferous magnetites: Brunton, 13; Kemp, 98d, 99e; Newland, 13; microstructure: Singewald, 13c

Titaniferous ore: Hulst, 05; Newberry, 71h, Singewald, 13; origin: St. Clair, 14a

Triassic ores, Eastern States: Frazer, 77a

United States: Baum, 08; Bell (I L) 75, 92; Birkinbine, 92; Eckel, 05b; Hayes (C W), 09; Hunt, 90; Leith, 06; Newberry, 74g; Wenström, 92; ore reserves: Kemp, 10



**Iron—Continued.**

- Western States: Putnam, 86  
 World supplies: Gregory (J W), 11  
 Zonal growth in hematite: Sosman, 17
- Iron bacteria: Harder, 15  
 Iron pyrites, decomposition: Julien, 86; microscopic structure: Julien, 86a  
 Iron County coal field, Utah: Lee (W T), 07a  
 Iron Creek region, Alaska: Smith (P S), 07a, 09a  
 Iron Mountain, Wyo.: Ball (S H), 07c  
 Iron River district, Mich.: Allen (R C), 09b, 10  
 Iron Springs district, Utah: Leith, 08a  
 Iroquois beach: Davis (W M), 91c; Spencer (J W), 90b, 91e; isobases of: Goldthwait, 10a  
 Irvine oil field, Estill Co., Ky.: Shaw (E W), 17  
 Irving, J. D., biography: Kemp, 18, 18a; Lindgren, 18d, e  
 Irving, R. D., biography: Chamberlin (T C), 89; Powell, 89c; Russell, 90b  
 Island series: Ward (L F), 96a  
 Isle of Pines, Cuba: Jennings, 13; Scudder, 65c  
 Isles of Shoals: Hovey (H C), 95a  
 Isobase maps.  
   Algonquin and Iroquois beaches: Goldthwait, 10a  
   Algonquin and Nipissing shore lines: Goldthwait, 10  
   Great Lakes region: Gilbert, 97a, 98  
 Isobases, Great Lakes region: Taylor (F B), 95a; postglacial uplift: Fairchild, 18, 18b; Geer, 92  
 Isogeotherm hypothesis: Plotts, 05  
 Isopoda. *See* Crustacea.  
 Isostasy.  
   Asthenosphere: Barrell, 14a  
   California, Great Valley: Ransome, 96a  
   Causes of regional elevations and subsidences: Dutton, 71  
   Crustal deformation: Lane, 06c  
   Distribution of isostatic compensation: Bowie, 17b  
   Earth's crust, strength: Barrell, 14a  
   Figure of the earth: Hayford, 09, 10  
   General: Barrell, 14a; Becker, 15; Bowie, 14; Gilbert, 93a, 95d, e; Hayford, 12, 12a; Holland, 14; McGee, 81; MacMillan, 17; Nutting, 11; Putnam, 12; Ransome, 96a; Reid (H F), 11a; Schioetz, 01; Spencer (J W), 14; Willis, 11  
   Geodetic evidence: Bowie, 14a, 17c, d; Hayford, 06  
   Glacial epoch, relation to: Salisbury, 94a  
   Gravimetric survey: Bowie, 17a  
   Gravity anomalies: Barrell, 14a; Gilbert, 13 in locating salt domes: Shaw (E W), 17e relation to geologic formations: Bowie, 12a  
   Gravity investigations: Bowie, 17; Hayford, 17  
   Gravity reduction: Bowie, 12b  
   Gulf of Mexico as a measure: McGee, 92  
   Isostatic compensation: Hobbs, 16  
   Planetesimal theory, relation to isostasy: Chamberlin (T C), 16b  
   Relations to geodesy, geophysics, and geology: Hayford, 11  
   Rigidity of earth: Hoskins, 06; See, 06c  
   Theory of: Davis, 10e; Lewis (H), 11

**Isostasy—Continued.**

- Topography and isostatic compensation: Bowie, 12  
 Volcanic islands, isostatic subsidence: Davis (W M), 17b  
 Isotelus gigas, ontogeny: Raymond (P E), 14  
 Isthmus of Tehuantepec: Spear, 72  
 Itacolumite: Edwards (A M), 70; California: Blake, 77; South Carolina: Lieber, 59a, c  
 Ithaca fauna, Maryland: Swartz, 07; central New York: Clarke (J M), 05d  
 Jackson, C. T., biography: Woodworth, 97a  
 Jackson folio, Cal. (no. 11): Turner, 94  
 Jackson's Purchase region clays, Ky.: Gardner (J H), 05b  
 Jamaica.  
   Caribbean region, geological connections: Guppy, 09  
   General: Adams (C B), 45a; Dela Beche, 27; Hill (R T), 98f; Raymond (R W), 07; Scotland, 90; Nicholas, 99; Sawkins, 69  
*Economic geology.*  
   Copper mines: Outerbridge, 09, 09a  
   Copper-bearing granite, Saint Thomas in the Vale: Henwood, 71c  
   Mineral deposits: Nicholas, 08c; Outerbridge, 09a  
*Historical geology.*  
   Clarendon district: Duncan, 65  
   Cretaceous, southeastern Jamaica: Barrett, 60  
   General: Dela Beche, 27; Duncan, 65; Hall (M), 13; Hershey, 98; Hill (R T), 99; Sawkins, 69; Spencer (J W), 98c  
   Geologic history: Spencer (J W), 98c  
   Granite associated with Tertiary strata, Kingston: Sawkins, 63  
   Tertiary, correlation: Vaughan, 18d  
   White limestone: Lennox, 64  
   Yellow limestone, age: Hill (R T), 97  
*Minerology.*  
   General: Sawkins, 69  
   Pseudomorphs after halite: Hovey, 97a  
*Paleontology.*  
   Barrettia: Whitfield, 97c; Woodward (S P), 62  
   Clarendon district: Duncan, 65  
   Corals, Cretaceous and Eocene: Vaughan, 99  
   Echinoidea, Tertiary: Michelin, 56  
   Foraminifera: Brady, 76; Jones (T R), 76  
   General: Etheridge, 69; Hill (R T), 99  
   Lucina: Dall, 01c  
   Mollusca: Cockerell, 94  
   Pelecypoda, Bowden fauna: Woodring, 17  
   Prorastomus: Owen (R), 55b  
   Rudistae, Cretaceous: Whitfield, 97b  
   Scaphopoda: Pilsbry, 11  
   Tertiary Mollusca: Guppy, 66, 73; Moore (J C), 63  
*Petrology.*  
   Limestone, white, structure: Hill (W), 91a  
*Physical geology.*  
   Earthquakes: Hall (M), 09  
   Kingston, January, 1907: Brown (C W), 07; Carden, 07; Cornish, 08, 12; Davison (C) 07; Fuller, 07; Hall (M), 07, 07a, 09; Hobbs, 08; Hovey, 09a; Marvin, 07; Mountmorres, 07; Spencer (J W), 07b  
   After-shocks of earthquake of January 14, 1907: Milne, 10  
   Port Royal: Ellis, 92



**Jamaica—Continued.***Physiographic geology.*

- Evolution, geographic: Spencer (J W), 96c  
 General: Hill (R T), 99; Spencer (J W), 98c  
 Karst region: Daneš, 06, 10, 14  
 James, J. F., biography: Gilbert, 98c; Stanton, 98  
 James, U. P., biography: James (J F), 89a  
 James River basin, Va.: Taber (S), 13  
 Jamestown-Tower folio, N. Dak. (no. 168): Willard, 09  
 Jarbidge district, Nev.: Buckley, 11b; Schrader, 12; Sweetser, 10  
 Jasper Park coal fields, Alta.: Dowling, 11a  
 Jaspilite beds, Minnesota: Winchell (H V), 89a  
 Jefferson limestone and fauna: Kindle, 08b  
 Jefferson Canyon, Nev.: Packard, 09  
 Jerome district, Ariz.: Finlay (J R), 18a  
 John Day Basin, Oreg.: Knowlton, 02; McClung, 06; Merriam, 00a, 03b, 06b, 07  
 Johnstown folio, Pa. (no. 174): Phalen, 10  
 Johnstown region, Pa.: Phalen, 11a  
 Jointing.

Absence of joint structure at great depths: Crosby, 14b

Classification and origin: Crosby, 83

Dodecahedral jointing: Lahee, 10

Effect on degradation: Ehrenfeld, 16

General: Buckley, 09; Crosby, 86b; Hitchcock (E), 41b; Jackson, 41a; Mather, 41b; Sheldon (P), 12; Silliman (jr), 41; Woodworth, 96a, 97b

Joint veins: Gilbert, 02c

Laws of jointing: Grammer, 13; Stevens (B), 13b

Limestone, Cumberland Gap, Tenn.: Shaler, 95e

New York, Thousand Islands region: Cushing, 10a

Ontario, Temagami-Temiskaming district: Pirsson, 10a

Origin: Gilbert, 82c, 84; Kinahan, 82, 83; McGee, 83; in clay and marl: Le Conte (John), 82; of joint cracks: Walling, 83

Parallel and intersecting joints, origin: Crosby, 93a

Postglacial joints: Gilbert, 82b

Prismatic structure, types of, in igneous rocks: Sosman, 16

Simultaneous joints: Becker, 05a

Torsional theory: Becker, 95a

Wisconsin, Baraboo quartzite range: Steidtmann, 10.

Joplin district. *See* Missouri.

Joplin folio, Mo.-Kans. (no. 148): Smith (W S T), 07a

Jordan River valley, Utah: Richardson (G B), 06

Jorullo: Ordóñez, 06e

Judith River beds: Bowen (C F), 15; Hatcher, 02f, 03b, c, d; Knowlton, 05; Peale, 12; Stanton, 02, 05; Sternberg, 81d, 83, 03a; turtles accredited to: Knowlton, 11b

Juglandaceae, Pleistocene, Maryland: Berry, 09c

Juneau gold belt, Alaska: Spencer (A C), 06a

**Jurassic.**

Alaska: Brooks (A H), 07; Emerson (B K), 04; Martin (G C), 12

Alaska Peninsula: Atwood, 11; and Cook Inlet: Stanton, 05c

**Jurassic—Continued.**

Alaska: Berners Bay region: Knopf, 11

Cape Lisburne region: Collier, 06

Chitina Valley: Moffit, 18

Cook Inlet region: Paige, 07; Stanton, 05c

Copper River region: Mendenhall, 05

Gravina and Revillagigedo islands: Chapin, 18a

Gulkana-Susitna region: Moffit, 12

Hanagita-Bremner region: Moffit, 14

Herendeen Bay field: Paige, 06

Iliamna and Clark lakes region: Martin (G C), 10a

Iliamna region: Martin (G C), 12a

Kenai Peninsula: Martin (G C), 15

Kotsina-Chitina region: Moffit, 09b

Matanuska Valley: Martin (G C), 06b, 12a

Matanuska and Talkeetna basins: Paige, 07b

Mount McKinley region: Brooks (A H), 11

Nelchina-Susitna region: Chapin, 18

Nizina district: Moffit, 11a

Noatak-Kobuk region: Smith (P S), 13a  
 southwestern: Spurr, 00

Turnagain Arm region: Moffit, 06

Yakutat formation: Ulrich, 04a

Alberta: Malcolm, 13

Bighorn coal basin: Malloch, 11

Blairmore area: Leach, 12

Crowsnest field: Rose, 17a; McLearn, 16

Jasper Park: Dowling, 11a

Moose Mountain district: Cairnes, 07

Roche Miette area: Dowling, 12

Rocky Mountains: Allan, 13

Sheep River field: Dowling, 14a, c

South Fork district: MacKenzie, 14

Arctic regions: Dawson (G M), 87a; Feilden, 78; Haughton, 59

Arizona, Grand Canyon district: Dutton, 82

Navajo country: Gregory (H E), 17

Atlantic Coastal Plain: Kerr, 75a; Marsh, 96e, 98a

Atlantosaurus beds: Hatcher, 03; Williston, 05

Baptanodon beds: Williston, 05

Black Hills region: Hayden, 58; Loomis, 02; Meek, 58b

Bragdon formation, Cal.: Hershey, 04

British Columbia, Atlin district: Cairnes, 13

coast region: Bancroft (J A), 13

Crowsnest and Flathead areas: Rose, 18

Elko to Kootenay Lake: Schofield, 13

Flathead area: MacKenzie, 16a

Franklin mining camp, West Kootenay: Drysdale, 15

Golden-Kamloops: Daly (R A), 15

Graham Island: Clapp (C H), 14a; MacKenzie, 14a, 16b

Moresby Island: McConnell, 10a

Nanaimo area: Clapp (C H), 12a, 14

Nelson area: LeRoy, 12a

New Westminster and Nanaimo districts: LeRoy, 08

northern: Whiteaves, 77

Prince Rupert-Aldermere: McConnell, 14a

Quadra Island: Cairnes, 14e

Rosslund: Bruce, 17a

Saltspring and Vancouver Islands: Allan, 10

Skeena River district: Leach, 10; McConnell, 13; Malloch, 12a



## Jurassic—Continued.

- British Columbia: Slocan district: LeRoy, 10  
 Telkwa River district: Dolmage, 17  
 Texada Island: McConnell, 10a, 14  
 Thompson River valley: Drysdale, 14  
 Tulameen district: Camsell, 13  
 Vancouver area: Burwash, 18  
 Vancouver Island: Clapp (C H), 12, 12c, 13b, e  
   Cooke area: Clapp (C H), 17  
   Duncan area: Clapp (C H), 14b, d, 17  
   Kyuquot Sound: Clapp (C H), 14e  
   Sicker series: Cooke (H C), 17  
   southern: Clapp (C H), 14b  
   Sutton Jurassic: Clapp (C H), 11a  
 Victoria and Saanich quadrangles: Clapp (C H), 11  
 West Kootenay and Boundary districts: LeRoy, 13  
 Ymir area, West Kootenay district: Drysdale, 17  
 California: Diller, 08; Hyatt, 94a; Smith (J P), 10, 16  
   Berkeley Hills: Lawson, 02  
   Cantua-Panoche region: Anderson (R), 11  
   Coalinga district: Arnold, 09a; Pack, 14b  
   coast ranges, southern: Fairbanks, 98  
   Colfax region: Moody, 17  
   eastern: Spurr, 03  
   Lassen Peak quadrangle: Diller, 95  
   Monterey Co.: Davis (C H), 13  
   Mount Diablo Range: Anderson (F M), 05  
   Nevada City and Grass Valley districts: Lindgren, 96b  
   Redding quadrangle: Diller, 06  
   San Francisco district: Lawson, 14  
   Santa Cruz quadrangle: Branner, 09b  
   Santa Lucia Mountains: Davis (C H), 13  
   Shasta Co.: Fairbanks, 94e; Smith (J P), 94a  
   Sierra Nevada: Lindgren, 94c; Smith (J P), 94b; Turner, 94a, 96  
   Taylorville region: Diller, 92, 08b; Hyatt, 92  
 Canada: Ami, 00a; Dowling, 09  
 Colorado: Marvine, 74  
   Boulder district: Fenneman, 05b  
   Canon City: Hatcher, 01d  
   Castle Rock quadrangle: Richardson (G B), 15  
   central: Peale, 75  
   Colorado Springs quadrangle: Finlay (G I), 16  
   Denver region: Cannon, 95b; Eldridge, 89, 90; Emmons (S F), 96  
   Elk Mountains: Holmes (W H), 76  
   Engineer Mountain quadrangle: Cross, 10  
   Front Range: Hallowell, 82a; Hayden, 76  
   Grand Mesa and West Elk Mountains: Lee (W T), 12a  
   Grand River district: Peale, 77, 78  
   Grand River valley: Riggs, 01  
   north central: Henderson (J), 09  
   North Park: Beckly, 15  
   northern: Ziegler, 17b  
   northwestern: Gale, 10; White (C A), 78d, 89  
   Ouray quadrangle: Cross, 07a  
   Perry Park: Kruger, 10

## Jurassic—Continued.

- Colorado: Pikes Peak sheet: Cross, 94  
 Rabbit Ears region: Grout, 13a  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain front range: Darton, 04c  
 Rocky Mountains: Hills, 91c  
 San Miguel: Hills, 80  
 southern: Lee (W T), 02; Stevenson, 75  
 southwestern: Cross, 14a; Hills, 82  
 Walsenburg quadrangle: Hills, 00  
 western: Cross, 07  
 Cordilleran region: King (C), 78a; Lindgren, 15a  
 Cretaceous-Jurassic boundary: Osborn, 15c  
 Cuba: DeGolyer, 18; Torre, 10, 12; Vesa y Fillart, 09  
   Viñales, Pinar del Rio: Corral, 11  
 Eastern North America: Dana (J D), 83a  
 General: Broadhead, 83; Cope, 87c; Fraas, 06a; Marcou, 57, 96b; Marsh, 96c; Miller (S A), 81; White (C A), 85d, 89b  
 Great Plains: Darton, 05; Marcou, 97a  
 Greenland: Böggild, 17; Nordenskjöld, 09  
   eastern: Skeat, 04  
   northeastern: Nathorst, 01; Ravn, 11a  
   Scoresby Sound region: Bay, 96  
 Idaho, Fort Hall Indian Reservation: Mansfield (G R), 16b  
   southeastern: Mansfield, 16, 16c; Peale, 79a; Richards (R W), 14a; Schultz, 13, 18  
 Jurassic-Cretaceous boundary: Hill (R T), 96  
 Marine closing beds: Pavlow, 92  
 Maryland: Clark (W B), 97b, 06c  
   Patuxent quadrangle: Shattuck, 07c  
   Potomac group: Clark (W B), 97d, 02b  
 Maryland and New Jersey: Lewis (H C), 80h  
 Mesozoic floras of North and South America: Knowlton, 18  
 Mesozoic invertebrate faunas: Stanton, 09  
 Mexico: Böse, 98; Burckhardt, 15; Nikitin, 90  
   Durango: Angermann, 07; Burckhardt, 10, 10b, 12  
   Mixteca Alta: Wieland, 13  
   San Pedro del Gallo: Burckhardt, 10a  
   Sierra de Mazapil et Santa Rosa: Burckhardt, 06b  
 Montana: Meek, 73  
   Big Horn basin: Fisher (C A), 06  
   Big Horn Mountains: Darton, 06e  
   Birch Creek-Sun River region: Stebinger, 18  
   Bowdoin dome: Collier, 17  
   Cascade Co.: Barnett, 16  
   Castle Mountain district: Weed, 96a  
   Cleveland field: Bowen (C F), 14a  
   Electric coal field: Calvert, 12b  
   Elkhorn Mountains: Stone (R W), 11  
   Garnet Range: Pardee, 18  
   Garrison-Philipsburg fields: Pardee, 17  
   Great Falls region: Fisher (C A), 09, 09a; Weed, 92  
   Helena region: Knopf, 13  
   Judith Mountains: Weed, 98  
   Lewistown field: Calvert, 09a  
   Little Rocky Mountains: Weed, 96b  
   Livingston quadrangle: Iddings, 94  
   northeastern: Collier, 18a  
   northern and central: Morton, 76



**Jurassic—Continued.**

**Montana:** Philipsburg quadrangle: Calkins, 15;  
     Emmons (W H), 13b  
     southwestern: Condit, 18  
     Sweetgrass Co.: Douglass, 09a  
     Three Forks region: Haynes, 16a  
**Morrison and Sundance formations, relation:**  
     Lee (W T), 17d  
**Morrison formation:** Mook, 15, 16; Stanton, 05b  
     age: Berry, 15c; Knowlton, 16g; Lee (W T),  
         02, 15b; Lull, 15a; Schuchert, 18a; Stanton,  
         15  
     New Mexico: Darton, 15d  
**Nevada, Esmeralda Co.:** Turner, 02  
**New Mexico:** Huene, 11; Keyes, 05c; Marcou,  
     89f  
     Navajo country: Gregory (H E), 17  
     northern: Lee (W T), 02  
**North America:** Logan, 00; Willis, 12; southern:  
     Stanton, 18  
**North Carolina:** Stephenson, 07  
**Oregon:** Diller, 08; Knowlton, 10d  
     Curry Co.: Butler (G M), 16  
     eastern: Washburne, 03  
     southwestern: Diller, 07a, 14a; Louderback,  
         05; Winchell (A N), 14a  
**Pacific Ocean borders:** Dacqué, 11  
**Paleogeographic map:** Willis, 09  
**Potomac group:** Clark (W B), 97d, 02b  
**Rocky Mountains:** Engelmann, 76; Hayden,  
     61, 68c  
**South Carolina:** Sloan, 08  
**South Dakota:** Darton, 09a; Hayden, 62; Todd,  
     95, 98  
     Belle Fourche quadrangle: Darton, 09e  
     Black Hills: Carpenter (F R), 88; Darton,  
         99b, 01a, 04c, 09, 18; Newton, 80; Stone  
         (R W), 12; Ward (L F), 99; Winchell  
         (N H), 75  
     Edgemont quadrangle: Darton, 04a  
**Texas:** Buckley, 74; Marcou, 96a, 97a; Udden,  
     16a  
     Malone district: Cragin, 05  
     northwestern: Marcou, 92a  
     Sierra Blanca: Stanton, 98b  
     southwestern: Cragin, 97a  
     trans-Pecos: Richardson (G B), 04  
**Utah:** Meek, 60a  
     Castle Valley: Lupton, 16a  
     eastern: Cross, 07  
     Green River desert: Emery, 18a  
     Green River field: Lupton, 14  
     high plateaus: Dutton, 80  
     Morgan Co., Lost Creek field: Clark (F R), 18a  
     northeastern: White (C A), 89  
     Park City district: Boutwell, 12  
     San Juan oil field: Woodruff, 12  
     Sanpete and Sevier valleys: Richardson  
         (G B), 07  
     southeastern: Forrester, 18a  
     southern: Richardson (G B), 09a  
     Uinta Mountains: Powell, 76; Weeks, 07  
**Virginia:** Fontaine, 79; Coastal Plain: Clark  
     (W B), 06d  
**Western States:** White (C A), 79f  
**Wyoming:** Darton, 08; Hayden, 69c  
     Aladdin quadrangle: Darton, 05b

**Jurassic—Continued.**

**Wyoming:** Bald Mountain and Dayton quad-  
     rangles: Darton, 06c  
     Big Horn Basin: Hewett, 17; Hintze, 15  
     Big Horn Mountains: Darton, 04c, 06e  
     Big Muddy dome: Barnett, 14b  
     Black Hills region: Darton, 09; Stone (R W),  
         12  
     Cloud Peak and Fort McKinney quadrangles:  
         Darton, 06d  
     Devils Tower quadrangle: Darton, 07b  
     Douglas oil field, Converse Co.: Barnett, 14;  
         Jamison, 12  
     Freeze-out Hills: Logan, 00a  
     Fremont Co.: Jamison, 11a  
     Green River district: Peale, 79  
     Hartville quadrangle: Smith (W S T), 03  
     Hay Creek coal field: Jenney, 99  
     Lander oil field: Woodruff, 11  
     Laramie and Sherman quadrangles: Darton,  
         10c  
     Laramie Basin: Darton, 09f  
     Laramie Mountains: Darton, 16a  
     Lincoln Co.: Schultz, 14  
     Newcastle quadrangle: Darton, 04  
     North Laramie Mountains: Spencer (A C), 16  
     northwestern: Eldridge, 94a  
     Owl Creek Mountains: Darton, 06  
     Powder River oil field: Wegemann, 12  
     Salt Creek oil field, Natrona Co.: Jamison,  
         12a; Wegemann, 18  
     Salt River Range: Mansfield, 16a  
     Shoshone River section: Hewett, 14b  
     southeastern: Knight (W C), 00a; Loomis, 01  
     Sundance quadrangle: Darton, 05a  
     Sweetwater district: Endlich, 79  
     western: Comstock, 74; Condit, 18; Peale,  
         79a; Schultz, 18  
     Wind River Range: Endlich, 79  
**Yellowstone and Missouri rivers:** Hayden, 69a  
**Yellowstone National Park:** Hague, 99  
**Yukon, Lewes and Nordenskiöld rivers dis-**  
     **trict:** Cairnes, 10  
     Wheaton River district: Cairnes, 10, 11a, 12  
**Juratrias.**  
     California, Colfax quadrangle: Lindgren, 00  
     Downieville quadrangle: Turner, 97  
     Jackson quadrangle: Turner, 94  
     Mother Lode district: Ransome, 00  
     San Luis quadrangle: Fairbanks, 04  
     Sonora quadrangle: Turner, 97a  
     Truckee quadrangle: Lindgren, 97  
**Colorado, Anthracite-Crested Butte quad-**  
     **rangles:** Eldridge, 94  
     La Plata quadrangle: Cross, 99a  
     Pueblo quadrangle: Gilbert, 97  
     Telluride quadrangle: Cross, 99  
     Tenmile quadrangle: Emmons (S F), 98  
**Montana, Fort Benton quadrangle:** Weed, 99  
     Little Belt Mountains: Weed, 99a  
     Three Forks quadrangle: Peale, 96  
**New Jersey, New York City district:** Merrill  
     (F J H), 02  
**South Dakota, Oelrichs quadrangle:** Darton,  
     02a  
**Wyoming, Yellowstone National Park:** Weed,  
     96



**Kachemak Bay coal fields, Alaska:** Stone (R W), 06

**Kames.**

Alaska, Yakutat Bay region: Tarr (R S), 08  
Derivation from englacial drift: Upham, 94b  
General: Stone (G H), 80; Reagan, 08a  
Maine: Stone (G H), 80, 81a, 83, 90  
Marginal kames: Lewis (H C), 85b  
Michigan, Lansing: Wooster, 84a  
New England: Shaler, 84b; Wright (G F), 79  
New York, Oriskany Valley: Harris (T W), 91  
Thousand Islands region: Cushing, 10a  
western: Fairchild, 96b  
North Dakota: Willard, 06h  
Origin: Lewis (H C), 85b; Shaler, 84b  
Rhode Island: Battey, 86

**Kamloops, B. C.:** Evans (H F), 05e

**Kanab coal field, Utah:** Richardson (G B), 09a

**Kanawha black flint:** Price (W A), 18a; White (I C), 02a

**Kanawha series:** Hennen, 14b; White (D), 00a

**Kansan drift sheet, age:** Hershey, 01c

**Kansas.**

Age: Smyth (B B), 85  
Bibliography: Hay (R), 96c  
Chalk: Patrick, 75; structure: Williston, 90  
Dexter, nitrogen gas well: Haworth, 05a  
Fieldwork, history of: Haworth, 08c  
Flint Hills: Mead (J R), 01  
Footmarks, supposed: Hitchcock (C H), 69a  
General: Emmons (S F), 93; Mudge, 77a; Swallow, 66a; Wooster, 00  
Geologic history: Wooster, 14  
Geologic work: Hay (R), 87b  
Geological survey: Brown (R J), 85; Haworth, 96  
Great Plains, geology: Hay (R), 93b  
Gypsum hills: Gould, 01d  
Lyon Co.: Smith (A J), 02  
Paleoliths: Winchell (N H), 13  
Sands, Kansas River valley: Kirk, 96a  
Southern Kans.: Cragin, 85, 85b  
Volcanic dust: Williston, 92b

*Economic geology.*

Atchison Co.: Hay (R), 96b  
Building stone: Bailey (E H S), 93; Hawes, 84  
Cement materials: Eckel, 13  
Chalk beds, Wakeeney: Broadhead, 82a  
Clay, Independence quadrangle: Schrader, 05a  
Coal: Haworth, 95c, 96b, 98; Saunders, 73  
Atchison Co.: Knerr, 96a  
Cherokee Co.: Haworth, 83  
composition: Bailey (E H S), 89a  
Cretaceous, north central Kans.: Crane, 03b  
Leavenworth district: Crane, 02a; Hinds, 17  
Lyon Co.: Kelly, 87  
southeastern Kans.: Broadhead, 82c; Crane, 01  
southern Kans.: Wittich (L L), 11  
Cottonwood Falls quadrangle: Prosser, 04  
Doniphan Co.: Hay (R), 96b  
Eastern Kans.: Hawn, 66  
Fort Riley Reservation: Hay, (R) 96  
General: Grimsley, 99a, 01, 02; Haworth, 01; Hay (R), 93a; Mudge, 66, 75b, 78; St. John, 83c; Swallow, 66

**Kansas—Continued.**

*Economic geology—Continued.*

Glass-sand deposits: Burchard, 06a, 07d  
Gold: Lovewell, 03, 03a  
Gold and silver, tests for, in western Kans.: Lindgren, 02  
Gravel, Burlington: Parker (J D), 81  
Independence quadrangle: Schrader, 06a, 08  
Gypsum: Cragin, 86; Grimsley, 96, 97, 97a, 98, 99, 04b  
Gypsum rocks, composition: Bailey (E H S), 97  
Iola: Grimsley, 03a  
Iola quadrangle: Adams (G I), 04c  
Kaw Valley anticline: Warfel, 15  
Lead, Cherokee Co.: Haworth, 84  
Galena-Joplin deposits: Bain, 01, 07a, 16; Haworth, 04; Ruhl, 08a; Siebenthal, 15; Smith (W S T), 03a, 07a  
Leavenworth Co.: Hay (R), 96b  
Leavenworth quadrangle: Hinds, 17  
Lignite: Hay (R), 89  
Manganese in Dakota sandstone: Whitaker, 17  
Miami Co.: Swallow, 65, 66  
Mineral resources: Grimsley, 03; Haworth, 98a; Mudge, 74  
Natural gas: Ashburner, 87d; Bailey (E H S), 95; Gould, 15; Grimsley, 03; Haworth, 95d, 96b, 01a, 08b; Moore (R C), 17  
Dexter: McFarland, 05  
eastern Kans.: Hay (R), 87c  
Independence quadrangle: Schrader, 05, 06a, 08  
Iola field, Allen Co.: Orton, 99b  
Iola quadrangle: Adams (G I), 04c; Kedzie, 77a; Patrick, 77a  
Ottawa: Yates, 03  
southeastern Kans.: Gould, 13a  
Wyandotte: Case, 77  
Nickel, Russell Springs, Logan Co.: Dewey, 89; Snow, 89  
Northwestern Kans.: Hay (R), 89d  
Ozark uplift: Haworth, 00  
Petroleum: Adams (G I), 01a; Bailey (E H S), 95; Bartow, 05; Gardner (J H), 17; Gould, 13a, 15; Grimsley, 03; Haworth, 95d, 96b, 01a, 08b; Moore (R C), 17; Whitaker, 18  
analyses: Day (D T), 09d  
Chanute fields: Haworth, 02  
eastern Kans.: Hay (R), 87c  
Independence quadrangle: Schrader, 05, 06a, 08  
Iola quadrangle: Adams (G I), 04c  
Portland-cement resources, Independence quadrangle: Haworth, 05  
Salt: Cox (E T), 88; Hay (R), 89c, e, 90c; Ellsworth Co.: Bailey (E H S), 89  
Southeastern Kans.: Case, 77a  
Southwestern Kans.: St. John, 87  
Volcanic ash: Udden, 98d  
Western Kans.: Elliott (R S), 71  
Wyandotte Co.: Hay (R), 96b  
Zinc, Cherokee Co.: Haworth, 84  
Galena-Joplin district: Haworth, 04  
Joplin district: Bain, 01, 07a, 16; Garrison, 00; Ruhl, 08a; Siebenthal, 15; Smith (W S T), 03a, 07a



## Kansas—Continued.

*Historical geology.*

- Americus limestone: Smith (A J), 01  
 Anthracolithic rocks: Beede, 09a; Prosser (C S) 10  
 Arkansas Valley: Mudge, 73a  
 Atchison: Price (J M), 96  
 Atchison Co.: Hay (R), 96b  
 Belvidere beds: Cragin, 95b  
 Borings, central Kans.: Perrine, 18  
   Chanute: Haworth, 02  
   Cherryvale: Bailey (E H S), 95  
   Elmdale: Smith (A J), 15  
   Emporia: Wooster, 88  
   Fort Scott: Bailey (E H S), 85  
   Leavenworth: Jameson, 89  
   Madison: Bushong, 99  
   Russell: Parker (J D), 84  
   Topeka: Smyth (B B), 96  
   Valley Falls: Langworthy, 01  
   Wichita: Meade (J R), 98  
   Wyandotte: Case, 77  
 Carboniferous: Adams (G I), 02c, 03; Beede, 98f; Broadhead, 81b, 84b; Crevecoeur, 03; Haworth, 96b; Meek, 65b; Prosser, 99b; West, 85; eastern Kans.: Wooster, 05, 06  
 Carboniferous and Permian: Prosser, 97c  
 Central Kans.: Perrine, 18  
 Cherryvale-Lawrence section: Haworth, 94d  
 Chert, Cherokee Co.: Haworth, 83a; south eastern Kans.: Haworth, 82  
 Cheyenne sandstone: Cragin, 90, 91; Prosser, 99c  
 Coal fields: Haworth, 96b, 98  
 Coal Measures: Beede, 99; Haworth, 95, 95c; Keyes, 95j, 00b  
   divisions: Haworth, 95b  
   faunal divisions: Beede, 08  
   Kansas section: Beede, 10  
   nomenclature: Haworth, 08a  
 Comanche series: Hill (R T), 95a; Vaughan, 97  
 Comanchean, central Kans.: Twenhofel, 18  
 Cottonwood Falls quadrangle: Prosser, 04  
 Cottonwood limestone: Yates, 11  
 Cottonwood River section: Haworth, 94b  
 Cretaceous: Cope, 72; Gould, 98; Hay (R), 96a; Meek, 58c, 65b; Mudge, 76  
   Lower: Gould, 00; Prosser, 97b  
   southwestern Kans.: Ward, 97c  
   Upper: Adams (G I), 98; Logan, 97  
 Crystalline rocks: Haworth, 15; geologic history: Moore (R C), 18a  
 Dakota group: Gould, 01e  
 Dakota sandstone: Hay (R), 85b; Washington Co.: Charles, 01  
 Dakota-Permian contact: Greene (F C), 10  
 Des Moines series: Keyes, 09e  
 Doniphan Co.: Hay (R), 96b  
 Eastern Kans.: Hawn, 66; Haworth, 94e; Hay (R), 87c; Swallow, 67  
 Effingham Ridge, Atchison Co.: Wilson (J W), 98  
 Ellsworth Co.: Bailey (E H S), 89  
 Fort Riley Reservation: Hay (R), 96  
 Fort Scott-Boone interval: Berger, 18

## Kansas—Continued.

*Historical geology—Continued.*

- General: Beede, 98b; Broadhead, 81a; Darton, 18a; Engelmann (H), 58, 76; Haworth, 01, 08d, 15; Hay (R), 87a, 89a, 93a; Hayden, 59, 62, 67c; Marcou, 58a, 60b; Meek, 59b; Moore (R C), 17; Mudge, 66, 75b, 78; Newberry, 76; Parker (H N), 11; St. John, 83c, 85; Schiel, 55; Smyth (B B), 85; Swallow, 58d, 59b, 66, 68; Vaughan, 97b; Williston, 95a, 99e; Wooster, 00, 05a  
 Granite in borings: Hay (R), 93e; Powers, 17a; Taylor (C H), 17; Wright (P), 17  
 Granite boulders associated with Pennsylvanian strata: Twenhofel, 17a  
 Gypsum area: Grimsley, 97a, 99  
 Independence quadrangle: Schrader, 08  
 Iola gas field: Orton, 99b  
 Iola quadrangle: Adams (G I), 04c  
 Joplin district: Smith (W S T), 07a  
 Kansas River section: Prosser, 94  
 Kaw Lake area: Todd, 18a  
 Kaw Valley anticline: Warfel, 15  
 Lansing deposit: Shimek, 04a  
 Lawrence shales: Yates, 09  
 Leavenworth Co.: Hay (R), 96b  
 Leavenworth quadrangle: Hinds, 17  
 Lignite, horizon: Hay (R), 89  
 Limestone, sandstone, and shale, relative value for stratigraphic work: Haworth, 94a  
 Logan and Gove cos., geologic map: Adams (G I), 98a  
 Logan Co.: Snow, 89  
 Loup Fork beds: Cragin, 91a; Sternberg, 82  
 Loup Fork Miocene: Sternberg, 06  
 Lyon Co.: Smith (A J), 02, 03  
 McPherson Equus beds: Beede, 98a; Haworth, 97b  
 Marion and Wellington formations: Gould, 01f  
 Marion stage formations: Beede, 09  
 Megalonyx beds: Udden, 91  
 Mentor beds, Comanche series: Cragin, 95a; Jones (A W), 98, 99, 03  
 Miami Co.: Swallow, 65, 66  
 Mississippian, southeastern Kans.: Haworth, 82  
 Neocene terranes: Cragin, 96c  
 Neosho River section: Beede, 06b; Haworth 94b  
 Northeastern Kans.: Meek, 57; Hay (R), 89d  
 Norton Co.: Hay (R), 85  
 Niobrara: Williston, 93, 97  
 Ottawa-Holliday section: Haworth, 94d  
 Ozark region: Adams (G I), 01  
 Paleozoic, upper, formations, classification: Prosser, 02a  
 Permian: Beede, 05; Cragin, 96a; Meek, 58a; Prosser, 94, 05b; Sternberg, 03c; Swallow, 58b, c; Williston, 97j  
   Blue Valley: Beede, 00b  
   classification: Prosser, 95a  
   northeastern Kans.: Meek, 64f  
   upper: Prosser, 97b  
 Permian and upper Carboniferous, southern Kans.: Prosser, 97d



## Kansas—Continued.

*Historical geology*—Continued.

- Permo-Carboniferous, Greenwood and Butler cos.: Wooster, 90  
 Platte series: Cragin, 96b  
 Pleistocene: Williston, 97a, 98c  
 Pleistocene history: Todd, 18  
 Pottawatomie and Douglas formations, Kansas River: Rogers (A F), 00e  
 Quaternary, southeastern Kans.: Broadhead, 79c  
 Reading blue limestone: Smith (A J), 05  
 Red beds: Adams (G I), 03a; Gould, 01a; age: Beede, 01a; Williston, 99f  
 Red sandstone, central Kans.: Mudge, 73  
 River cos.: Hay (R), 96b  
 Section, Atchinson-Barnes: Knerr, 96  
 Baxter Springs-Nebraska: Haworth, 96a  
 Bourbon Co.-Yates Center: Bennett (J), 96  
 Coffeyville-Lawrence: Haworth, 96b  
 Flint Hills: Gould, 96  
 Galena-Wellington: Adams (G I), 96a  
 Kansas City-McFarland: Bennett (J), 96  
 Manhattan-Abilene: Adams (G I), 96a  
 Neosho and Cottonwood rivers: Kirk, 96  
 Osage River: Hall (J G), 96  
 Shawnee Co.: Beede, 98  
 Shawnee, Wabaunsee, and Cottonwood formations: Beede, 02b  
 Silver City area: Twenhofel, 17  
 Southeastern Kans.: Broadhead, 82c  
 Southern Kans.: Cragin, 85, 85b, 89  
 Southwestern Kans.: Haworth, 97; Hay (R), 90; St. John, 87  
 Table of formations: Keyes, 15b, c  
 Tertiary: Mudge, 76  
 Harper Co., Cragin, 85a  
 materials: Haworth, 97a  
 Seward Co.: Adams (G I), 02b  
 Tertiary and Cretaceous: Mudge, 77  
 Triassic: Hay (R), 89b; so-called: Meek, 59a  
 Valley loess: Upham, 03  
 Verdigris River section: Haworth, 94c  
 Wilson Co., section: Hay (R), 87  
 Woodson Co., metamorphic deposit: Mudge, 81  
 Wyandotte Co.: Hay (R), 96b

*Mineralogy*.

- Anhydrite and associated minerals from salt mines: Rogers (A F), 10a  
 Barite, eastern Kansas: Bailey (E H S), , 90; pink, Atchison limestone; Knerr, 93  
 Calcite, Joplin district: Sterrett, 04a; western Kans.: Rogers (A F), 00a  
 Cherokee Co.: Haworth, 83b  
 Cone-in-cone (calcite): Harnley, 98  
 Covellite, Galena: Rogers (A F), 11  
 Cupro-goslarite, Cherokee Co.: Rogers (A F), 99  
 Galena-Joplin district: Rogers (A F), 04a  
 Gypsum, Coffey Co.: Rogers (A F), 00a  
 Joplin lead and zinc district: Rogers (A F), 00c  
 Limonite, octahedral, Dickinson Co.: Haworth, 85  
 List of minerals: Failyer, 93; Mudge, 81a  
 Menaccanite: Willard, 85  
 Meteorites: Farrington, 02b  
 Admire, Lyon Co.: Merrill (G P), 02, 02c

## Kansas—Continued.

*Mineralogy*—Continued.

- Meteorites: Brenham, Kiowa Co.: Hay (R), 93d; Kunz, 90, 90a, g; Snow, 90b; Winchell (N H), 90a  
 Cullison, Pratt Co.: Merrill (G P), 13a  
 Elm Creek aerolite: Howard, 07  
 Farmington, Washington Co.: Farrington, old; Kunz, 92; Preston (H L), 92a  
 Jerome, Gove Co.: Washington, 98a  
 Kiowa Co.: Bailey (E H S), 90b; Huntington, 91; Snow, 90  
 Modoc, Scott Co.: Farrington, 06c; Kunz, 06a; Merrill (G P), 06, 06b  
 Ness Co.: Ward (H L), 99  
 Oakley, Logan Co.: Preston (H L), 00b  
 Saline, Sheridan Co.: Farrington, 02a  
 Scott City: Merrill (G P), 12  
 Tonganoxie, Leavenworth Co.: Bailey (E H S), 91a; Snow, 91  
 Wacanda, Mitchell Co.: Patrick, 77; Shepard, 76a; Smith (J L), 77  
 Washington Co.: Kunz, 91c; Snow, 90a  
 Sphalerite, Galena: Rogers (A F), 00  
 Zinc sulphide, Cherokee Co.: Robertson (J D), 90

*Paleontology*.

- Aceratherium fossiger, restoration: Williston, 94  
 Anogmus polymicrodus, osteology; Stewart, 99d  
 Armadillo, Miocene: Cope, 86u  
 Bird track, Dakota sandstone; Snow, 87  
 Bison: McClung, 05; Norton Co., Kans.: Hay (R), 85a  
 Bison antiquus, osteology: Stewart (A), 97a  
 Bison latifrons: Mudge, 77b; Osborn, 09c  
 Bison occidentalis: Lucas (F A), 99a; restoration of skeleton: McClung, 08a  
 Bryozoa, Coal Measures: Rogers (A F), 00b  
 Buchiceras, Cretaceous: Cragin, 00a  
 Calamites: Knox, 75  
 Camelops kansanus: Leidy, 54e  
 Campophyllum: Beede, 98e  
 Carboniferous: Adams (G I), 03; Beede, 02, 02b, 16; Girty, 03a, 08a; Meek, 58c; Schiel, 55a; Shumard (B F), 58e  
 Cephalopoda: Hyatt, 91  
 corals: Beede, 98c  
 Crinoidea: Beede, 00a; White (C A), 80  
 Invertebrata: Beede, 00; catalog: Bennett (J), 96a  
 sponges: Girty, 08a  
 Castoroides skull: Martin (H T), 13  
 Cephalopoda, Permo-Carboniferous: Hay (R), 93c  
 Chalk, Niobrara Cretaceous: Dawson (G M), 90e; Williston, 90c  
 Chonetes granulifer, development: Greene (F C), 08a  
 Cimoliosaurus, Niobrara formation: Williston, 90a  
 Cirriped Crustacea, Niobrara beds: Logan, 97a  
 Coal Measures fauna: Beede, 99b, 00c, 08; Roger (A F), 00e; Shumard (B F), 58b  
 Cockroaches from Coal Measures and Permian: Sellards, 08g



**Kansas—Continued.***Paleontology—Continued.*

- Colonosaurus: Marsh, 72q  
 Comanchean invertebrates: Cragin, 94b  
 Cretaceous: Cope, 72; Cragin, 89; Logan, 99; Meek, 71  
   Invertebrata: Cragin, 94; Logan, 98, 99b; White (C A), 80c  
     microscopic organisms: McClung, 98  
     reptiles and fishes: Cope, 71, 78f  
 Ctenoptychius, Permian: Martin (H T), 13a  
 Cyclus, Coal Measures: Rogers (A F), 02  
 Dakota beds, flora: Hollick, 95; Sternberg, 81f  
 Dinosaur, armored, Cretaceous: Sternberg, 09b  
 Dolichorhynchus, restoration: Williston, 02  
 Edentates, Miocene (correction): Williston, 98f  
 Enaliosaur, Fort Wallace: Cope, 68b  
 Enchodus, teleostean: Green (W R), 13  
 Erisichte, Niobrara beds: Cope, 77d  
 Estheriae, red beds: Jones (T R), 98  
 Eucalyptus: Ward (L F), 98a; Dakota beds, southwestern Kans.: Ward (L F), 97  
 Euphorbiaceae: Cockerell, 09l  
 Ficus, Cheyenne sandstone: Berry, 05a  
 Fish locality: Twenhofel, 14a  
 Florena shale fauna: Greene (F C), 08  
 Footprints: Mudge 66a, 74a  
   Coal Measures: Marsh, 94c  
   Permian: Moodie, 13  
 Foraminifera, Hooser: Spandel, 01  
 Forest, fossil, Jackson Co.: Shattuck, 05  
 Fossil nut, Woodson Co.: Hay (R), 87d  
 Fossil wood: Hay (R), 83a  
 General: Hayden, 59; Meek, 59b  
 Glenopteris, Permian, Dickinson Co.: Sellards, 00a  
 Goniatite, eastern Kans.: Meek, 76a  
 Hadrosaurus: Marsh, 72c  
 Haploscapha, Niobrara beds: Conrad, 75  
 Hesperornis, dermal covering: Williston, 96a  
 Horse, drift, Marysville: Swallow, 66c  
 Hydreionocrinus, Coal Measures: Weller, 98b  
 Ichthyodectes: Hay (O P), 98a  
 Ichthyological notes: McClung, 08  
 Ichthyornis: Marsh, 73  
 Insecta, Belvidere: Gould, 99  
 Invertebrata, upper Missouri: Meek, 65a  
 Labyrinthodont: Moodie, 10b, 11a; Williston, 97i  
 Lansing human remains: Owen (L A), 03; Up- ham, 02c, d; Williston, 02h, 03b; Wright (G F), 03, 03b; geologic relations: Cham- berlin (T C), 02  
 Leptecodon, Niobrara beds: Williston, 99a  
 Leptichthys, Cretaceous fish: Stewart (A), 99  
 Llama remains: Cragin, 92  
 Loup Fork fauna: Cope, 80d; Scott (W B), 90a  
   plants: Cragin, 91a  
 Machaerodus, Loup Fork beds: Cope, 87p; Cragin, 92a  
 Mammalia, Burlington: Leidy, 70i  
 Mammoth, Franklin Co.: Charlton, 90  
 Mastodon, Douglas Co.: Savage, 78  
   Franklin Co.: Wheeler (W), 78  
   Gomphotherium: Hay (O P), 17  
   Loup Fork Miocene: Sternberg, 07a  
 Megalonyx, McPherson Co.: Lindahl, 92

**Kansas—Continued.***Paleontology—Continued.*

- Mentor fauna: Jones (A W), 98, 05  
 Monopteria: Beede, 98e  
 Mosasauridae: Williston, 91a, 92a, 99; dermal covering: Snow, 78; restorations: Willis- ton, 97g  
 Mustelidae, Loup Fork beds: Cope, 90f  
 Myelopteris, Topeka: Penhallow, 97  
 Neosho River section: Beede, 06b  
 Nyctodactylus: Williston, 02d  
 Odontornithes: Marsh, 73b  
 Ogmodirus, Cretaceous plesiosaur: Williston, 17b  
 Ornithosauria, Cretaceous: Cope, 72f  
 Ornithostoma, mandible: Williston, 95b; resto- ration: Williston, 97b; skull: Williston, 96  
 Oxyrhina, Cretaceous: Eastman, 95  
 Pachyrhizodus, Cretaceous: Stewart (A), 99b  
 Pelecypoda, Coal Measures: Beede, 99c; Wor- then, 82a  
 Pennsylvanian vertebrates: Twenhofel, 14b  
 Pennsylvanian and Permian faunas: Beede, 09b  
 Permian, northeastern Kans.: Meek, 64f  
   flora: Sellards, 00  
   insects: Sellards, 03c  
 Pisces: Mudge, 75a  
   Carboniferous: Eastman, 03a; Leidy, 59, 73  
   Cretaceous: Cope, 72d, 73zb; Crook, 92; Loomis, 00; Sternberg, 07; Stewart (A), 98, 98c, 99c, 00; Williston, 00, 00a; Portheus mo- lossus: Woodward, 13; Logan Co.: Os- born, 04e  
 Plants, Belvidere: Knowlton, 95b  
   Carboniferous: White (D), 03  
   Cretaceous: Hollick, 03b; Lesquereux, 71  
   Dakota group: Hollick, 03a  
   Onaga: Crevecoeur, 03  
   Paleozoic: Sellards, 08f  
   Permian: Sellards, 01a  
   Tertiary: Lesquereux, 71  
 Platecarpus, Elkader: Williston, 98b, 99; mounted: Williston, 10b  
 Platygonus: Peterson, 14b; Williston, 94e; res- toration: Williston, 94d  
 Pleistocene: Williston, 97a, 98c  
   Mammalia: Cope, 95b  
   molluscan fauna, Phillips Co.: Hanna, 13  
 Plesiosaurian skull, structure: Williston, 90d  
 Plesiosaurus, Comanche shales: Williston, 97d  
 Pliocene, western Kans.: Mudge, 75  
 Porthochelys, Cretaceous: Williston, 01  
 Proetus, Greenwood Co.: Williams (H S), 81a  
 Protosphyraena: Felix, 90a; Hay (O P), 02d  
 Protostega, western Kans.: Cope, 72g  
 Protozoa, chalk: Patrick, 83  
 Pseudomonotis, Coal Measures: Beede, 99a  
 Pteranodon: Williston, 91  
 Pterodactyls: Marsh, 71d, 72a, 84c; Williston, 92  
 Pythonomorpha, Cretaceous: Cope, 71h, 72b; Merriam, 94  
 Reptilia, Cretaceous: Cope, 69c, 70l, 72h, n; Marsh, 71c; Williston, 02a  
   Fort Wallace: Cope, 68n  
   Sheridan: Cope, 72m  
 Rhabdomeson, Lawrence: Rogers (A F), 00d  
 Riley Co., list of fossils: Mason, 83



**Kansas—Continued.***Paleontology—Continued.*

- Rodent, Miocene: Gidley, 07  
 Sagenodus, Coal Measures: Williston, 99b  
 Saurian, Benton: Cragin, 88; Niobrara Wierland, 09  
 Saurocephalus, Wallace: Hay (O P), 99a  
 Saurodon: Stewart (A), 98b  
 Saurodontidae: Cope, 71d, 73a, 92m  
 Shawnee Co.: Beede, 98  
 Sigillaria, southern Kans.: Walters, 91  
 Snoutfishes: Hay (O P), 02d  
 Southern Kans.: Stanton, 95a  
 Southwestern Kans.: Case, 94  
 Taeniopteris, Permian: Sellards, 01  
 Teleoceras: Osborn, 98b  
 Teleosts, Cretaceous: Cragin, 01  
 Tertiary Mammalia: Cope, 78i  
 Testudinata, Cretaceous: Cope, 72c  
 Tetracaulodon (Tetrabelodon), Loup Fork beds: Wagner, 99  
 Tetralophodon campester, Loup Fork beds: Cope, 78q  
 Toxochelys: Case, 98a; Cope, 73zc; Wagner, 98  
 Toxochelys stenopora: Hay (O P), 09a  
 Triassic: Hawn, 58  
 Turtle, Dakota beds: Parmenter, 99; Desmatochelys lowi, Benton formation: Williston, 94b  
 Tusk from Equus beds: Deere, 08  
 Tylosaurus: Osborn, 99f; extremities: Williston, 97f  
 Uintacrinus socialis: Bassler, 09c; Bather, 96; Beecher, 00; Hill (B H), 94; Grinnell, 76a; Meek, 76c; Schuchert, 04; Springer, 01; Williston, 94c  
 Vertebrata, Cretaceous: Cope, 71n, o, t, 75; Sternberg, 05, 07b, 08, 11, 13; Williston, 94a, 98  
 Equus beds: Hay (O P), 17e  
 Neocomian: Cragin, 94c  
 Permian: Sternberg, 03c; Williston, 97c, j, 98d  
 Wood replaced by calcite, Russell: Greenland, 18  
 Xerobates, Loup Fork beds: Gilbert (J Z), 98  
 Xiphactinus, Cretaceous: Leidy, 70e; Stewart (A), 98a, 99a  
 Xiphosuran, Permian: Beecher, 04

*Petrology.*

- Crystalline rocks: Moore (R C), 17  
 Igneous rocks: Hay (R), 83  
 Volcanic dust, McPherson Co.: Harnly, 95

*Physical geology.*

- Central Kans.: Perrine, 18  
 Concretions, Ottawa Co.: Bell (W T), 01  
 Deformation, Meade Co.: Haworth, 96c  
 General: Darton, 18a; Smyth (B B), 85  
 Horsebacks, coal measures: Crane, 96  
 Metamorphism, Silver City area: Twenhofel, 17  
 Ripple marks in limestone: Wooster, 84b  
 Sink holes, Meade Co.: Mudge, 79  
 Wabaunsee Co.: Savage, 81  
 Spring River deposits: Hershey, 96  
 Tertiary, materials: Haworth, 97a  
 Wood replaced by calcite, Russell: Greenland, 18

**Kansas—Continued.***Physiographic geology.*

- Camp Funston region: Moore (R C), 18  
 Chert gravels, eastern Kans.: Wooster, 15  
 Cottonwood Falls quadrangle: Prosser, 04  
 Drift deposits: Knox, 74  
 Eastern Kans.: Haworth, 94f  
 General: Adams (G I), 02a; Beede, 98b; Williston, 95a  
 Glacial striae: Wooster, 92  
 Glaciation: Swen, 96; northeastern Kans.: Hay (R), 93f  
 Gravel bed, Burlington: Parker (J D), 84a  
 Gravels, Carboniferous area: Haworth, 96b  
 eastern Kans.: Haworth, 94g  
 southern Kans.: Broadhead, 84a  
 High Plains: Johnson (W D), 01  
 Kansas icesheet, drainage: Todd, 09a  
 Kaw lake area: Todd, 18a  
 Leavenworth quadrangle: Hinds, 17  
 Limit of drift: Wooster, 88a  
 Moraine, Topeka: Wooster, 13  
 Shawnee Co.: Smyth (B B), 96a; and Wabaunsee cos.: Smyth (B B), 98a  
 "Moraines": Todd, 13b  
 Peneplains: Beede, 17  
 Pleistocene, Lansing: Winchell (N H), 03c  
 Pleistocene crustal movements in Mississippi Valley: Todd, 13  
 Salt marshes: Hay (R), 90b  
 Southeastern Kans.: Adams (G I), 98b  
 Wakarusa Creek, history: Todd, 11a  
 Western Kans.: Haworth, 97a; surface deposits: Broadhead, 04b  
 Wisconsin deposits: Todd, 13c
- Underground water.*  
 Artesian water: Gregory (J W), 90  
 Artesian wells: Hay (R), 90d  
 General: Parker (H N), 11; St. John, 85; Williston, 95a  
 Ground-water table, lowering of: Cook (W A), 14  
 Joplin district: Smith (W S T), 05b  
 Mineralsprings and wells, geologic distribution: Crane, 02  
 Mineral waters: Bailey (E H S), 02  
 Southwestern Kans.: Haworth, 97  
 Tertiary springs: Gould, 01c  
 Underflow in Arkansas Valley: Slichter, 06; near St. Francis: Wolff, 11  
 Waters from sandstone in Lawrence shales: Young (C C), 11  
 Well waters: Haworth, 13  
 Western Kans.: Adams (G I), 97a; Haworth, 97c  
 Wichita area: Meinzer, 14
- Kantishna region, Alaska: Prindle, 06b  
 Kaolin.  
 Appalachian States, southern: Watkins, 15; Watts, 13  
 General: Hughes (W W), 15; McDonald (P B), 14  
 Georgia: Veatch (J O), 07, 09; Dry Branch region: Sproat, 16; Veatch (J O), 08b  
 Kentucky: Gardner (J H), 05  
 Maryland: Ries, 02a  
 Mexico, Coahuila: Castro, 09; Yextho: Aguilera, 08



**Kaolin—Continued.**

- Missouri, Bollinger Co.: Orton (jr), 07  
 Ontario, Lake Nipigon district: Romanet du  
 Caillaud, 08  
 Origin: Lindgren, 15c; Ries, 00d; Veatch (J O),  
 08b; Watkins, 15  
 Quebec, Huberdeau: Ries, 12b; Labelle Co.,  
 Amherst Township: Wilson (M E), 17a;  
 St. Remi: Keele, 18a  
 South Carolina: Sloan, 07; Aikin district:  
 Sproat, 16  
 Wisconsin: Irving, 76a

**Karsts.**

- Illinois, East St. Louis district: Bowman (I), 07  
 Jamaica: Daneš, 06, 10, 14

- Kasaan Peninsula, Alaska: Wright (C W), 08b, 15  
 Katalla oil field, Alaska: Thompson (A), 12

- Kawishiwin agglomerate, Minnesota: Winchell  
 (N H), 92e

**Keewatin.**

- Explorations: McInnes, 06a; Cape Tatnam re-  
 gion: Dobbs, 06; Canadian Northern rail-  
 way: O'Sullivan, 06a

- Hudson Bay from York Factory to Severn  
 River: O'Sullivan, 06

- James Bay: Wilson (A W G), 06

- Winisk and Attawapiskat rivers: McInnes, 06

**Paleontology.**

- Silurian: Whiteaves, 06; stromatoporoids:  
 Parks, 08c

- Keewatin ice sheet, Montana lobe: Calhoun, 06

- Keewatin series: Lawson, 85

- Kenai Peninsula, Alaska: Martin (G C), 15; min-  
 eral resources: Brewer (W M), 12

- Kennebec River basin, Me.: Smith (G O), 07f

- Kennedy mining district, Nev.: Klopstock, 13

- Kenovafolio, Ky.-W. Va.-Ohio (no. 184): Phalen 12

- Kenova quadrangle: Phalen, 06b, 08a, 12

**Kentucky.**

- Chemical report: Peter (R), 56, 57, 57a, 61, 76,  
 78, 80, 84, 85, 85a, 88, 05

- Dix River: Foerste, 12

- Early geological surveying: Bain, 10b

- General: Shaler, 74, 76c, 77b

- Geological survey: Winchell (A), 67a; reports:  
 Hoeing, 13; Norwood, 05a; Procter, 82;  
 Shaler, 74, 77a, b, c, e, 80

- Great Bone Lick: Turner (G), 99

- Ordovician rocks, composition: Foerste, 13c

- Soils: Averitt, 15; Jones (S C), 10, 13; Owen  
 (D D), 57b; Franklin Co.: Miller (A M),  
 14; Hartford quadrangle: Jones (S C), 12

- Union Co.: Lyon, 56

**Economic geology.**

- Asphalt rock: Burk, 03; Crump, 13a; western  
 Ky.: Orton, 91

- Barite: Fohs, 10a, 13; Watson (T L), 15

- Bath Co.: Linney, 86; iron: Kindle, 06b

- Big Sandy Valley: Brown (C N), 00

- Bituminous rock: Eldridge, 01; Morris (M), 97

- Breckenridge cannel coal district: Norwood,  
 78a

- Building stone: Crump, 98

- Bowling Green oolitic limestone: Crump, 16;  
 Gardner (J H), 10c

- Waverly formation: Morse (W C), 12

- Cannel coal: Macfarlane, 90; Chinn's Branch  
 district: Crandall, 80

**Kentucky—Continued.****Economic geology—Continued.**

- Cement materials: Eckel, 13

- Clay: Crider, 13a; Crump, 98; Easton, 13;  
 Gardner (J H), 05c; Prosser, 93c

- analyses: Gardner (J H), 05c

- Clinton Co.: Loughridge, 90

- Crittenden and Livingston cos.: Fohs, 05

- east central Ky.: Foerste, 06

- Hartford quadrangle: Gardner (J H), 12

- Jackson's Purchase region: Gardner (J H), 05b

- northeastern Ky.: Greaves-Walker, 07; Pha-  
 len, 06c

- Kenova quadrangle: Phalen, 08a, 12

- Red River Valley: Gardner (J H), 05a

- Silurian: Foerste, 05

- western Ky.: Crider, 06a; Gardner (J H), 05

- Cobalt, western Ky.: Fohs, 07

- Coal: Ashley, 02; Hayes, 02b; Lesquereux,  
 61a; Owen (D D), 56, 57a, 61; Procter, 87

- analyses: Hoeing, 14; Quickel, 10

- Big Sandy basin: Althouse, 04; Brown (C N),  
 00; Crandall (A R), 05; Griffith, 11; Hoe-  
 ing, 13a

- Big Stone Gap field: Campbell (M R), 93;  
 Pultz, 04; Shippen, 08

- Black Mountain district: Dilworth, 12

- Bull Creek region: Hodge (J M), 13b

- Carr Fork field: Hodge (J M), 13b

- Central City, Madisonville, Calhoun, and  
 Newburg quadrangles: Hutchinson, 10

- Clay Co.: Hodge (J M), 14a, 18b; Sexton Creek  
 area: Russell (P G), 18

- Cumberland field: Ashley, 04, 04a, 06; Hodge  
 (J M), 12; Pultz, 07

- Cumberland Plateau: Duffield, 02

- Dawson springs quadrangle: Crider, 14

- Drakesboro quadrangle: Crider, 15a

- Dunmor quadrangle: Crider, 15b

- Earlington quadrangle: Crider, 14a

- eastern field: Crandall, 77, 80a; Lesley (J),  
 61, 73; Lyon, 57a; Macfarlane, 96; Miller  
 (A M), 08, 10

- Elkhorn coal field: Stone (R W), 07, 08; White  
 (D), 08a

- Elliott Co.: Crandall, 87a

- Goose Creek: Hodge (J M), 18b

- Hancock Co.: Moore (P N), 78d

- Harlan Co.: Hodge (J M), 16

- Harlan field: Peck (W R), 13, 15; Sampson, 15

- Hartford quadrangle: Gardner (J H), 12

- Jackson and Rockcastle cos.: Sullivan, 91

- Jellico field: Evans (A W), 05

- Kenova quadrangle: Phalen, 06b, 08a, 12

- Kentucky River region: Hodge (J M), 08

- north fork: Hodge (J M), 18; Hoeing, 13a

- Perry and Knott cos.: Hodge (J M), 13a

- three forks: Hodge (J M), 10

- Knox Co.: Hodge (J M), 14a

- Leslie and Harlan cos.: Hodge (J M), 18

- Letcher Co.: Crider, 16

- Licking Valley region: Crandall (A R), 10a;  
 Magoffin Co.: Hodge (J M), 13

- Little Muddy quadrangle: Crider, 15c

- London quadrangle: Campbell (M R), 98a

- Middlesboro: Boyd (C R), 90

- Muhlenberg Co.: Moore (P N), 77a



## Kentucky—Continued.

*Economic geology*—Continued.

Coal: Nortonville quadrangle: Crider, 15  
 Ohio Co.: Norwood, 80  
 Owensboro quadrangle: Crider, 13  
 Perry Co.: Hodge (J M), 14, 14b  
 Pineville Gap: Crandall (A R), 12  
 Pound quadrangle: Butts, 14  
 Pound Gap region: Crandall, 87  
 Quicksand creeks region: Fohs, 12  
 Russell Fork basin: Stone (R W), 08  
 Shawneetown quadrangle: Lee (W), 16  
 southeastern Ky.: Hodge (J M), 87, 87a;  
 McCreath, 88; Norwood, 77  
 Tell City quadrangle: Crider, 13  
 Tradewater River region: Glenn, 12  
 Tug Fork region: Crandall (A R), 10  
 Union Co.: Lyon, 56  
 Webster Co.: Glenn, 12a  
 western field: Allen (J H), 88; Caldwell, 78;  
 Hutchinson, 12; Lyon, 57, 61; Norwood,  
 76, 78; Nolin River district: Moore (P N),  
 77  
 Whitley Co.: Crandall, 91  
 Wolfe and Breathitt cos.: Moore (P N), 78c  
 Coal fields, eastern and western, original con-  
 nection: Shaler, 87a  
 Coal seams, correlation: Orton, 84k  
 Dawson Springs quadrangle: Crider, 14  
 Earlington quadrangle: Crider, 14a  
 Eastern Ky.: Lesley (J P), 65a  
 Edmonson Co.: Bryant (J O), 14  
 Elliott Co.: Crandall, 87a  
 Fire clays: Crider, 13a; Greaves-Walker, 07  
 Fluorspar, western Ky.: Bain, 04e; Burk, 01;  
 Fohs, 07, 09; Harwood, 03; Ulrich, 03, 05  
 Fluorspar, lead, and zinc deposits: Fohs, 10  
 Franklin Co.: Miller (A M), 14  
 General: Mather, 39; Owen (D D), 56, 57, 61;  
 Procter, 87; Shaler, 76b  
 Glass-sand industry: Burchard, 07c  
 Grayson Co.: Bryant (J O), 14  
 Greenup and Carter cos.: Lyon, 57  
 Greenup, Carter, and Boyd cos.: Crandall, 77  
 Hancock Co.: Moore (P N), 78d  
 Hartford quadrangle: Gardner (J H), 12  
 Iron: Chauvenet, 86  
 Bath Co.: Kindle, 06b; Linney, 86  
 Clinton ores: Whinery, 12  
 Greenup, Boyd, and Carter cos.: Moore (P N),  
 76  
 Hartford quadrangle: Gardner (J H), 12  
 Kenova quadrangle: Phalen, 08a, 12  
 Middleboro: Boyd (C R), 90  
 northeastern, Ky.: Phalen, 06  
 Red River region: Moore (P N), 78  
 western Ky.: Caldwell, 78  
 Jackson Co.: Sullivan, 91  
 Jackson's Purchase region: Loughridge, 88  
 Jefferson Co.: Butts, 15  
 Kaolin deposits: Gardner (J H), 05  
 Kenova quadrangle: Phalen, 06b, 08a, 12  
 Kentucky River region: Hodge, 08  
 Lead deposits: Brinsmade, 07  
 central Ky.: Miller (A M), 05  
 Henry Co.: Norwood, 77a  
 origin: Shaler, 77

## Kentucky—Continued.

*Economic geology*—Continued.

Lead deposits: Owen Co.: Brinsmade, 07  
 western Ky.: Norwood, 76a; Ulrich, 03, 05  
 Lewis and Rowan cos.: Fohs, 10b  
 Limestone: Eckel, 13  
 east central Ky.: Foerste, 06  
 oolitic limestone, Bowling Green, Warren Co.:  
 Gardner (J H), 10c; Crump, 13  
 Limonite, Cumberland River region: Caldwell,  
 80  
 Lithographic stone, eastern Ky.: Ulrich, 02a  
 Livingston-Cumberland Gap: Norwood, 77  
 London quadrangle: Campbell (M R), 98a  
 Marion Co.: Knott, 85  
 Marls, analyses: Gardner (J H), 05c  
 Mason Co.: Linney, 86a  
 Meade and Breckenridge cos.: Foerste, 10a  
 Middlesboro district: Fleming, 92; Procter, 92  
 Morgan Co.: Lane, 02i  
 Natural gas: Fischer, 87; Hoeing, 05  
 eastern and south central Ky.: Munn, 10b  
 Kenova quadrangle: Phalen, 12  
 Knox Co.: Munn, 12b  
 Meade and Breckenridge cos.: Foerste, 10a  
 Menifee field: Munn, 13  
 western Ky.: Orton, 91  
 Nitre: Brown (S), 09  
 Nolin River district: Moore (P N), 77  
 North Cumberland Valley: Procter, 80  
 Ochreous deposit, Boone Co.: Warder, 82  
 Ohio Co.: Norwood, 80  
 Oil, black shales: Ashley, 17  
 Oil and gas fields, eastern and south central  
 Ky.: Munn, 10b; Knox Co.: Munn, 12b  
 Oil and gas possibilities: Fohs, 15; in Newburg,  
 Calhoun, Central City, and Madisonville  
 quadrangles: Hutchinson, 10a  
 Oil fields: Leonard, 18; Thayer, 18a  
 Oil, gas, and asphalt rock in Meade and Breck-  
 enridge cos.: Foerste, 10a  
 Onyx, Barren Co.: Gorby, 99  
 Owensboro quadrangle: Crider, 13  
 Petroleum: Fuller, 17; Gardner (J H), 17b;  
 Hoeing, 05, 13; Leonard, 18; Pemberton,  
 18; Safford, 66  
 Barboursville: McCallie, 03b  
 Barren Co.: Fischer, 90  
 Campton oil pool: Munn, 12a  
 eastern Ky.: Lesley (J P), 65a  
 eastern and south central Ky.: Munn, 10b  
 Irvine field: Shaw (E W), 17  
 Knox Co.: Munn, 12b  
 Monticello quadrangle: Munn, 14a  
 Ragland oil field: Munn, 13  
 western Ky.: Orton, 91  
 Phosphate: Gardner (J H), 12a; Waggaman, 12;  
 central Ky.: Foerste, 13d; Phalen, 17  
 Pound Gap region: Crandall, 87  
 Rockcastle Co.: Sullivan, 91  
 Shawneetown quadrangle: Lee (W), 16  
 Southeastern Ky.: Hodge (J M), 87, 87a; Mc-  
 Creath, 88  
 Stone, Lewis and Rowan cos.: Fohs, 10b  
 Tell City quadrangle: Crider, 13  
 Waverly formation: Morse (W C), 12  
 Wayne Co.: Munn, 14a



**Kentucky—Continued.***Economic geology—Continued.*

Webster Co.: Glenn, 12a

Western Ky.: Lyon, 57; fluorite district: Ulrich, 05

Whitley Co.: Crandall, 91

Zinc, central Ky.: Miller (A M), 05

Crittenden Co.: Wheeler (G D), 02

western Ky.: Fohs, 10; Ulrich, 03, 05

*Historical geology.*

Arnheim formation: Foerste, 12b

Barboursville: McCallie, 03b

Bath Co.: Linney, 86

Bedford, Indian Fields and Irvine: Foerste, 09a

Big Stone Gap coal field: Campbell (M R), 93

Blue Grass region: Matson, 09

Breathitt Co.: Moore (P N), 78c

Campton oil pool: Munn, 12a

Carboniferous: Lesquereux, 61a

eastern Ky.: Lesley (J), 61; Stevenson, 04

western Ky.: Norwood, 76

Central Ky.: Foerste, 13d; Linney, 82; Lyon, 57; Miller (A M), 05; Owen (D D), 47a; Phalen, 17

Chattanooga shale, unconformity at base: Kindle, 12a

Chattanooga series: Ulrich, 12

Chester series, western Ky.: Ulrich, 03, 05, 17

Cincinnati anticline: Foerste, 02

Cincinnati group: Miller (S A), 74a

Clark Co.: Linney, 85

Clinton Co.: Loughridge, 90

Coal fields, connection across central Kentucky: Miller (A M), 09; Shaler, 87a

Coal Measures: Lesley (J P), 58a, 65a; Worthen, 71a

Rockcastle Co.: Stevens (R P), 74d

Cumberland Mountain region: Ashley, 06; Duffield, 02; Moore (P N), 78a

Cumberland Valley, Bell and Harlan cos.: Crandall, 78a

Cynthiana formation: Miller (A M), 15

Dawson Springs quadrangle: Crider, 14

Devonian: Foerste, 01; and Mississippian: Williams (H S), 05; central Ky.: Kindle, 99

Drakesboro quadrangle: Crider, 15a

Dunmor quadrangle: Crider, 15b

Earlington quadrangle: Crider, 14a

Eastern coal field: Lyon, 57a

Eastern Ky.: Crandall, 80a

Edmonson Co.: Bryant (J O), 14

Elliott Co.: Crandall, 87a; dike: Crandall, 85; Diller, 87

Eocene: Berry, 16a; Heilprin, 86a

Estillville quadrangle: Campbell (M R), 94

Falls of the Ohio region: Clapp (A), 41; Hall, 79c

Fleming Co.: Linney, 86

Franklin Co.: Miller (A M), 14

Garrard Co.: Linney, 83

General: Christy, 48; Fischer, 87; Fohs, 15; Hall, 43c; Hoeing, 05; Lyon, 60b, 61; Owen (D D), 45, 56, 57, 57a, 61; Safford, 66; Shaler, 76b, 77d

Geologic map: Hoeing 07; Saylor, 65b; Sellier, 17

Georgetown quadrangle: Miller (A M), 13a; map: Miller (A M), 17a

Grayson Co.: Bryant (J O), 14

**Kentucky—Continued.***Historical geology—Continued.*

Greenup and Carter cos.: Lyon, 57

Greenup, Carter, and Boyd cos.: Crandall, 77

Gulf embayment area: Glenn, 06, 06c

Hancock Co.: Moore (P N), 78d

Henry Co.: Linney, 87

Irvine oil field: Shaw (E W), 17

Jackson Co.: Sullivan, 91

Jackson's Purchase region: Loughridge, 88

Jefferson Co.: Butts, 15

Kenova quadrangle: Phalen, 12

Knox Co.: Munn, 12b

Lead region, Henry Co.: Norwood, 77a; western Ky.: Norwood, 76a

Lignitic stage: Harris, 97

Lincoln Co.: Evans (H A), 89; Linney, 83a

Little Muddy quadrangle: Crider, 15c

Livingston-Cumberland Gap: Norwood, 77

London quadrangle: Campbell (M R), 98a

Louisville region: Bassler, 09b; Lapham, 28; Lyon, 69; Yandell, 47; boring: Smith (J L), 59

Mammoth Cave region: Newberry, 82a

Marion Co.: Knott, 85

Mason Co.: Linney, 86a

Menifee Co.: Crandall, 78

Mercer Co.: Linney, 83b

Mississippi Bluffs: Berry, 15b

Mississippian formations, western Ky.: Butts, 16, 17b; Ulrich, 05

Montgomery Co.: Linney, 85

Morgan Co.: Lane, 02i

Nelson Co.: Linney, 84

Nolin River district: Moore (P N), 77

North central Ky.: Foerste, 14

Nortonville quadrangle: Crider, 15

Ohio Co.: Norwood, 80

Oil and gas fields: Hoeing, 05

Oldham Co.: Linney, 87

Ordovician: Foerste, 01; Miller (A M), 06; Ulrich, 88a

central Kentucky: Foerste, 13c; Nickles, 05  
classification: Foerste, 05b

Pine Mountain region: Stone (R W), 07d

Pottsville series: Campbell (M R), 00b

Pound quadrangle: Butts, 14

Pound Gap region: Crandall, 87

Pulaski Co.: Miller (S A), 79b

Red River region: Moore (P N), 78

Richmond group: Foerste, 03

Richmond quadrangle: Campbell (M R), 98

Rockcastle Co.: Sullivan, 91

Shawneetown quadrangle: Lee (W), 16

Shelby Co.: Linney, 87

Silurian: Foerste, 01; and Devonian: Foerste, 06

Southeastern Ky.: Hodge (J M), 87, 87a

Spencer Co.: Linney, 84

Table of geologic formations: Miller (A M), 17

Trenton: Miller (S A), 80c; Wetherby, 80a, b

Unconformity at base of Onondaga: Kindle, 13b

Union Co.: Lyon, 56

Warren Co., map: Hoeing 91

Washington Co.: Linney, 83c



## Kentucky—Continued.

*Historical geology*—Continued.

- Waverly formations: Morse, 09, 12  
 Wayne Co.: Munn, 14a  
 Webster Co.: Glenn, 12a  
 Western coal field: Hutchinson, 12; Norwood, 78; eastern border: Moore (P N), 78e  
 Western Ky.: Glenn, 06, 06c; Lyon, 57; Ulrich, 03, 05  
 Whitley Co.: Crandall, 91  
 Wolfe Co.: Moore (P N), 78c  
 Yalc district, eastern Ky.: Ulrich, 02a

*Mineralogy*.

- Meteorite, Allen Co.: Whitfield (J E), 87  
 Bath Furnace: Miller (A M), 03, 03a, b; Ward (H A), 03, 05a  
 Carroll Co.: Kunz, 87b, f  
 Cynthiana: Smith (J L), 77d  
 Eagle, Carroll Co.: Kunz, 90  
 Eagle Station: Prior, 18  
 Frankfort: Smith (J L), 70a  
 Kenton Co.: Preston (H L), 92, 93  
 Mount Vernon, Christian Co.: Merrill (G P), 03; Tassin, 05  
 Nelson Co.: Cohen, 92  
 Nelson and Marshall cos.: Smith (J L), 60  
 Oldham Co.: Smith (J L), 61a  
 Salt River: Cohen, 92; Silliman (jr), 51b  
 Smithland, Livingston Co.: Cohen, 92; Troost, 46  
 Williamstown: Howell, 08, 08a  
 Vivianite, Eddyville: Dudley, 90

*Paleontology*.

- Aerocrinus, Grayson Co.: Yandell, 55  
 Beatricea: Shaler, 77h  
 Bedford fauna, Indian Fields and Irvine; Foeste, 09a  
 Big Bone lick: Cooper, 31, 31a; Faujas de Saint-Fond, 03; Gazlay, 30a; Lyell, 43b; Rafinesque, 32a; Wistar, 18  
 Blastoidea, Mississippian: Lyon, 60c  
 Brachiopoda: Shaler, 76  
 Brachiospongia, Franklin Co.: Beecher, 89a; Hovey (H C), 75; Marsh, 67b  
 Calceolidae, Silurian: Lyon, 79  
 Carboniferous Echinodermata; Lyon, 57b  
 Cephalopoda: Miller (S A), 92a  
 Chaetetes, Falls of the Ohio: Rominger, 92  
 Chester fauna, Pulaski Co.: Miller (S A), 79b  
 western Ky.: Ulrich, 17  
 Cincinnati fossils: Foerste, 09c; James (J F), 91; James (U P), 74b; Miller (S A), 74; Ulrich, 78a, 79  
 Brachiopoda: Miller (S A), 75  
 Bryozoa: Nickles, 05; Ulrich, 79a  
 Cephalopoda: Miller (S A), 75a  
 Crustacea: Miller (S A), 74b  
 Gastropoda: Miller (S A), 74d  
 Pelecypoda: Miller (S A), 74c  
 Protozoa: James (J F), 87  
 Cincinnati and Lexington fossils: Foerste, 09d, 10, 12a  
 Coal Measures, Mollusca: Cox (E T), 57; Plan-tae: Lesquereux, 57  
 Coniferous wood, Marion Co.: Schaeffer, 51  
 Corals, Silurian and Devonian: Davis (W J), 85

## Kentucky—Continued.

*Paleontology*—Continued.

- Crangopsis, Boyle Co.: Ortmann, 97  
 Crinoidea: Lyon, 59, 60, 61a, 62  
 Chester group, Pulaski Co.: Wetherby, 79b, 81  
 Devonian: Miller (S A), 94  
 Louisville area: Lyon, 69  
 Mississippian: Miller (S A), 97; Wetherby, 80  
 Cynthiana formation, fauna: Miller (A M), 15  
 Cystoidea: Foerste, 14b  
 Devonian: Herzer, 02a  
 Falls of the Ohio: Ulrich, 86; problematic organism: Knowlton, 89b  
 Devonian and Mississippian: Williams (H S), 05; central Kentucky: Kindle, 99  
 Devonian black shale fauna: Girty, 98  
 Eleutheroocrinus, Louisville: Shumard (B F), 56  
 Eocene: Berry, 16a  
 Falls of the Ohio: Cozzens, 46; Bryozoa: Hall, 83l  
 fishes, palæoniscid, Boyle Co.: Eastman, 13  
 Paleozoic: Hussakof, 13  
 Vanceburg: Miller (A M), 16a; Newberry, 68a  
 Georgetown quadrangle: Miller (A M), 13a  
 Kalymma, Moreland: Dawson (J W), 91c  
 Louisville area: Hall, 72; Yandell, 47  
 Megalonyx: Harlan, 31  
 Mississippian, Pulaski Co.: Wetherby, 79b, 80b, 81  
 Bryozoa: Ulrich, 82  
 western Ky.: Butts, 17b  
 Mollusca and Brachiopoda, Silurian and Devonian: Nettleroth, 89  
 Ordovician faunas: Foerste, 13b; Nickles, 05  
 Ostracoda: Ulrich, 90f, 00  
 Oxen, fossil, Big Bone lick: Faujas de Saint-Fond, 03  
 Paleozoic Invertebrata: Miller (S A), 93, 96c  
 Pentremites: Say, 25  
 Peripristis, Caldwell Co.: Eastman, 02e  
 Plants, Columbus: Lesquereux, 59; Waverly, Boyle Co.: Scott (D H), 14  
 Proetus, Pulaski Co.: Wetherby, 81a  
 Rogers Gap fauna: Foerste, 14  
 Silurian fossils: Foerste, 09, 09b  
 Tamiobatis: Eastman, 97b  
 Tarandrus, Big Bone lick: Shaler, 69a  
 Trematodiscus, Kings Mountain: Wetherby, 81a  
 Trenton: Wetherby, 80b, 81a, b; Bryozoa: Ulrich, 82  
 Trianisites cliffordi: Rafinesque, 21

*Petrology*.

- Peridotite, Crittenden Co.: Diller, 92a; Elliot Co.: Diller, 85b, 86a, 87, 87a, 89a

*Physical geology*.

- Chestnut Ridge disturbance: Gardner (J H), 15  
 Colossal Cavern: Hovey (H C), 96, 04, 12  
 Cumberland Gap region: Shaler, 77f  
 Dike, Elliott Co.: Crandall, 87a  
 Earthquake: Audubon, 31  
 Faulting, north central Ky.: Miller (A M), 16  
 General: Shaler, 77d  
 Gravel and loan deposits of Kentucky rivers: Miller (A M), 95



**Kentucky—Continued.***Physical geology—Continued.*

Mammoth Cave: Forwood, 70; Gardner (J H), 10f, 11; Hovey (H C), 78, 90, 91, 91a, 96, 97, 97a, 08, 09, 12; Martel, 14; Nelson (N C), 17; Packard (A S), 71a; Silliman (jr), 51; Stevens (W L), 82; Turner (J W), 12; Whitbeck, 13a

bibliography: Hovey (H C), 12a

crystal growths: Call, 00

Middlesboro region: Ashley, 04b

Natural arches: Miller (A M), 98a

Quaternary lakes: Shaw (E W), 11c

Sandstone dikes, Eocene: Glenn, 04d

Subsidence, Trigg Co.: Freeman (H C), 87a

Wave marks: Foerste, 95

*Physiographic geology.*

Boyd Co., supposed glaciation: Wright (G F), 83b

Camp Taylor region: Butts 18a

Cumberland Gap region: Shaler, 77f

Drift deposits: Wright (G F), 84c; Boone Co.: Sutton, 77

Eastern Ky.: Hayes, 95h

Extinct lakes: Shaw (E W), 15

Glacial boundary: Wright (G F), 84

Glaciation: Stevens (R P), 83; White (I C), 84

Jefferson Co.: Butts, 15

Kenova quadrangle: Phalen, 12

Licking Valley, erratic pebbles: Squier, 83

Moraine, Louisville: Bryson, 89a

Preglacial channels, Louisville: Bryson, 90

Richmond quadrangle: Campbell (M R), 98

Wetwoods, Louisville: Bryson, 90a

*Underground water.*

General: Glenn, 04a, 05a

Blue Grass region: Matson, 09

Middlesboro-Harlan region, southeastern Ky.: Ashley, 05a

Kern region, Cal.: Lawson, 06a

Kerr, W. C., biography: Holmes (J A), 87

Kersantite: Newberry, 87

Ketchikan district, Alaska: Wright (F E), 08

**Kettleholes.**

Connecticut, New Haven region: Dana (J D), 83e

Formation: Tarr, 08

Indiana, Lake Maxinkuckee: Scovell, 96a

Massachusetts, Woods Hole: Koons, 84, 85

Wisconsin: Whittlesey, 60

Keuka Valley, N. Y.: Carney, 07b

Kewagama Lake area, Que.: Wilson (M E), 13c

Keweenaw series: Irving, 83b; Michigan: Lane, 11a

Keweenaw Point, Mich.: Lane, 06

Keweenawan diabases: Moore (E S), 11

Keweenawan fault: Lane, 13b

Keweenawan series: Brooks (T B), 76; Grant (U S), 95; Van Hise, 11; Winchell (N H), 95l, m; age: Lane, 12f

Keweenawan system, lithology: Pumpelly, 80

Kilauea. *See* Hawaii.

Killarney granite, age: Collins (W H), 16

Killdeer Mountains, N. Dak.: Quirke, 18

Kinderhook faunas: Weller, 05d, 09

Kinderhook stratigraphy: Keyes, 00; Weller, 01b

King, Clarence, biography: Emmons (S F), 02b, c, 07c; Hague (J D), 04; Raymond (R W), 03

Kingman district, Ariz.: Weed, 10

Kingston district, Ont.: Ells, 02

Kingston earthquake. *See* Jamaica.

Kingston folio, Tenn. (no. 4): Hayes, 94a

Kirkland Lake district, Ont.: Bateman, 17; Harding, 14; Spearman, 14

Kittanning folio, Pa. (no. 115): Butts, 04

Kittanning quadrangle, Pa.: Butts, 06a

Kittatinny limestone: Kimmel, 01b

Klamath Mountains, Oreg.: Diller, 96a, 01a, 02a

Klamath region, Cal.: Hershey, 06

Klondike district, Nev.: Spurr, 06a

Klondike region: Everette, 07; MacLean, 14; McConnell, 00, 06b, 07

Kluane district, Yukon: McConnell, 05a

Knight, W. C., biography: Barbour, 04; Nelson (A), 03; Williston, 04b

Knightite: Hills (B W), 09

Knobstone crinoid fauna: Springer, 11

Knoxville beds, Pacific coast: Stanton, 95

Knoxville folio, Tenn.-N. C. (no. 16): Keith, 95

Knoydart formation: Ami, 01f, g

Koninckina: Beecher, 90a

Kootanie formation: Dawson (G M), 89b; age: Berry, 15c

Kootanie plants: Knowlton, 07

Kootenay district, B. C.: Argall, 06

Kotsina Valley, Alaska: Moffit, 08a

Kougarok region, Alaska: Brooks (A H), 07b

Kowkash gold area, Ont.: Hopkins (P E), 17

Koyukuk-Chandalar region, Alaska: Maddren, 10a, 13

Koyukuk-Kobuk region, Alaska: Smith (P S), 11b

Kritosaurus: Brown (B), 10

Kunzite: Baskerville, 03

Labarge oil field, Wyo.: Schultz, 08

Labidosaurus hamatus, mounted skeleton: Broili, 08

**Labrador.**

Boulder accumulations: Wyman, 50b

General: Baddeley, 29; Bell (R), 84, 85c; Coleman, 18; Daly (R A), 02b; Lieber, 61, 61a; Packard (A S), 88, 91; Steinhauer, 14

Grand River region: Cary, 91

Northeastern coast: Daly (R A), 09a; Hantzsch, 09; Uhlig, 09

*Historical geology.*

General: Daly (R A), 02a; Lieber, 61; Packard (A S), 69

Northeastern coast: Coleman, 17c; Hind, 77

*Paleontology.*

Cambrian: Matthew (G F), 06b

Post-Pliocene: Dawson (J W), 60c

*Petrology.*

General: Wichman, 84

*Physical geology.*

Pan-ice work: Packard (A S), 77

*Physiographic geology.*

Drift phenomena: Hind, 64; Packard (A S), 65

Elevated beaches: Fuller, 07a

General: Daly (R A), 02a; Grenfell, 09; Packard (A S), 87a

Glacial movement, direction: Heilprin, 85d

Glaciation: Barton, 96; Low, 93a; Packard (A S), 67, 82; Tarr, 97f; Wright (G F), 95

Torngats: Coleman, 16d

Labradorite rocks: Cohen, 85



**Laccolithic intrusion, mechanics of:** Keyes, 18f  
**Laccoliths.**

Colorado: Hills, 95a

southeastern: Gilbert, 96b

southern: Gilbert, 96d

Form: Paige, 13b

General: Daly (R A), 13b; Cross, 94b; Gilbert, 77b; Weed, 99d

Laws of intrusion: Stevens (B), 11

Mechanics of igneous intrusion: Daly (R A), 03a

Montana: Weed, 97a

Butte: Lawson, 14a

Highwood Mountains: Pirsson, 05; Weed, 01b

Judith Mountains: Weed, 98

Little Belt Mountains: Weed, 00

New Mexico: Keyes, 09d

South Dakota, Black Hills region: Darton, 09;

Jaggar, 01; Harney granite: Ferguson (H G), 08

Utah, Henry Mountains: Dana (J D), 80; Gilbert, 77

**Laccoliths and ore deposits:** Storms, 99j

**Lacoe, R. D., biography:** White (D), 01d, 03a

**Lacustral record of past climates:** Keyes, 18

**Lacustrine and fluvial beds, criteria for distinguishing:** Davis (W M), 00c

**Lafayette beds, relations of:** Harris, 08a

**Lafayette formation:** Hilgard, 92a; McGee, 91b, 92e, 94d; Salisbury, 94d; Shaw (E W), 15e, 18; Smith (E A), 92d; Upham, 94c; Alabama: Johnson (L C), 94; Mississippi basin: Salisbury, 92b; type exposures of: Berry, 11h

**Lafayette period:** Upham, 94g

**Laflamme, J. C. K., biography:** Clarke (J M), 11e

**Lagomorpha:** Gidley, 12a

**La Grange formation:** Safford, 92b

**La Jolla sea caves:** Winsted, 13

**Lake Abitibi gold deposits, Ont:** Baker (M B), 09; Miller (W G), 07

**Lake Agassiz.** *See* Glacial lakes.

**Lake basins, ancient, Rocky Mountain region** Marsh, 75

**Lake basins created by wind erosion:** Gilbert, 95b

**Lake Champlain Valley, origin:** Clarke (J M), 07f

**Lake City district, Colo.:** Cross, 11

**Lake Erie, preglacial outlet:** Spencer (J W), 08d

**Lake George, physiography:** Kemp, 01e

**Lake Michigan glacier:** Guthrie, 90

**Lake of the Woods region:** Lawson, 85; Schoolcraft, 55a

**Lake Ojibway:** Coleman, 09b

**Lake Osoyoos copper deposits, Wash.:** Evans (H F), 08b

**Lake Pleasant quadrangle, N. Y.:** Miller (W J), 16a

**Lake ramparts.**

Formation: Hobbs, 11a; Meigs, 80

General: Adams (John), 25; Buckley, 01a; Chipman, 28; Gilbert, 08; Lee (C A), 25; Tyrrell, 10a; Wood (J), 25

Minnesota: Reagan, 11

Nova Scotia: Brodie, 12

Salisbury, Conn.: Lee (C A), 22

Vermont: Hitchcock (C H), 60b

**Lake shores, topographic features:** Gilbert, 85

**Lake Superior copper district.** *See* Michigan.

**Lake Superior highlands, origin and age:** Keyes, 15d

**Lake Superior region.** *See also* Michigan, Minnesota, Ontario, Wisconsin.

Basic massive rocks: Bayley, 93a

Geology: Bayfield, 29; Blandy, 73; Koch (F K L), 51

Physical geography: Martin (L), 11

Pleistocene geology: Martin (L), 11a

Stratigraphy: Irving, 88; Van Hise, 91a, 11

Taxonomy: Winchell (N H), 95p

**Lake Valley silver deposits, N. Mex.:** Keyes, 08

**Lake Wendigokan region, Ont.:** Moore (E S), 09c

**Lakes.** *See also* Glacial lakes.

Basins of lakes, origin: Upham, 96p

California, Blue Lakes: Holway, 07; desert dry lakes: Bailey (G E), 04

Classification: Davis, 87a

Coahuila basin: Powell, 91c

Colorado, alkali lakes of San Luis Valley: Fleck, 05

Crater Lake, Oreg.: Diller, 96c, 97, 11d; Patton, 02

Ephemeral lakes, arid regions: Keyes, 03b

Extra-morainic lakes: Lewis (H C), 87

Florida: Sellards, 10a, 14, 14e

Formation: Russell, 76; by ice action: Belt, 65

General: Brigham, 97a; Reid (C), 92; Scott (W B), 97c; Wallace (S J), 71

Glacial lakes, formation: Heydon, 99a

Great Basin region: Cope, 83m; Gale, 14; Keyes, 18; Russell, 84b; origin: Keyes, 18b

Great Lakes, origin: Bell (R), 99a; Spencer (J W), 96a; and structure: Newberry, 74u

Great Salt Lake: Gilbert, 78; Talmage, 00, 01b; ancient outlet: Packard (A S), 76a

Iceberg Lake, Glacier National Park: Freeman (O W), 16a

Idaho, Cœur d'Alene: Hershey, 12

Indiana: Dryer, 07

Maxinkuckee: Thompson (W H), 86a

morainic lakes: Dryer, 97

northern: Blatchley (W S), 01a; Levette, 76

Tippecanoe basin: Scott (W), 16

Iowa: White (C A), 68a; Wall lake: Wilder, 00a

Lake Chelan: Gannett, 98a, 05

Lake Erie, history: Spencer (J W), 94d

preglacial origin: Claypole, 82

shore-line studies: Wilson (A W G), 08

Lake George: Kemp, 01e

Lake Huron: Spencer (J W), 91c

Lake Michigan, former outlet: Davis (W M), 94c

Lake Ontario: Spencer (J W), 90b

preglacial origin: Claypole, 82

shore-line studies: Wilson (A W G), 08

Lake Superior, geological history: Bell (R), 99a; outlines: Agassiz (L), 49b

Lake Tahoe: Louderback, 11

Lake Temiscouata, Quebec: Bailey (L W), 86b

Marl lake: Davis (C A), 00a

Massachusetts, lakes enclosed by modified drift: Upham, 91f

Minnesota: Hall (R W), 93; Martin Co.: Upham, 84e

Mono: Russell, 89

Montana, Cliff Lake: Mansfield, 11

Morainic lakes: Dryer, 07



**Lakes—Continued.**

- Nevada: Russell, 95a; **Pyramid Lake**: Fairbanks, 01a
- New Mexico, Estancia Valley: Meinzer, 11
- New York: Spencer (J W), 12a  
 Finger Lakes: Brigham (A P), 93  
 Jamesville: Quereau, 98  
 Thousand Islands region: Cushing, 10a  
 western: Fairchild, 02
- North America: Kinley, 87; Russell, 95
- North Dakota, Devils-Stump lake region: Simpson (H E), 12
- Ontario, Temagami-Temiskaming district: Pirsson, 10a
- Oregon, Crater Lake: Diller, 96c, 97, 12; Dutton, 86  
 southern: Russell, 84
- Origin: Whitney, 80a
- Outlets, multiple: Grant (U S), 97; Watson, 97b
- Pennsylvania, Susquehanna Co.: Wilson (J H), 14
- Playa: Russell, 83a
- Rocky Mountains, Alberta: Wilcox, 99
- Salt lakes, origin: Rogers (H D), 50b
- Sink-hole lakes in Florida, origin: Scillards, 06
- Texas, Hardin Co., Sour Lake: Rössler, 76c
- Utah, Uinta Mountains: Atwood, 03
- Washington, Lake Chelan: Fairbanks, 02
- Wisconsin: Birge, 14  
 Devil's Lake: Trowbridge, 17  
 southeastern: Fenneman, 02
- Zuñi salt lake, N. Mex.: Darton, 05h
- Lakes, extinct.** *See also* Glacial lakes.
- Arizona, Lake Quiburis: Blake, 02c
- Black Hills, Tertiary: Darton, 99e
- Colorado, southern: Stevenson, 75
- Colorado Desert: Blake (W P), 54
- General: Scott (W B), 97c
- Great Basin region: Gilbert, 85a; Newberry, 71d
- Illinois, southern: Shaw (E W), 15
- Lake Bonneville: Davis (W M), 83g; Gilbert, 90; Talmage, 00, 02  
 age: Keyes, 18  
 orographic origin: Keyes, 17  
 outlet: Gilbert, 80
- Lake Cheyenne: Todd, 89a
- Lake Lahontan, Nev.: Russell, 83, 85  
 age, mammalian evidence: Merriam, 18  
 geological history: Gale, 15; Russell, 83
- Mississippi basin, Quaternary lakes: Salisbury, 11a; Shaw (E W), 11c
- Nevada: Russell, 95a
- Western States: Newberry, 70d
- Wisconsin: Knapp (J G), 72
- Lakes, glacial.** *See* Glacial lakes.
- Lambdotherium: Osborn, 97a, 13b
- Lamellibranchiata. *See* Pelecypoda.
- Laminated clays, interpretation: Berkey, 05
- Lancaster quadrangle, Wis.-Iowa (folio no. 145): Grant (U S), 07
- Lance formation: Knowlton, 11a; Stanton, 10a;  
 age: Brown (B), 14; Knowlton, 14a;  
 Stanton, 14
- Lance Creek beds, Wyo.: Hatcher, 03b; Hay (O P), 10a

- Land bridge between northern Europe and North America: Scharff, 09, 09a
- Land classification: Heroy, 13; Smith (G O), 13
- Lander coal field, Wyo.: Woodruff, 07
- Lander district, Nev.: Martin (A H), 10e
- Lander oil field, Wyo.: Woodruff, 11
- Landslides.**
- Accompanied by buckling: Van Horn (F R), 10
- Alberta, Frank: Ashworth, 05; Blakemore, 03;  
 Brewer (W M), 03c; Burling, 09; Daly (R A), 12c; Dowlen, 03; Green (R), 03;  
 McConnell, 04a; Smith (F B), 03
- California: Lawson, 08; earth-flows: Anderson (R), 07
- Colorado, Cimarron: Cross, 87  
 Gunnison Co.: Cross, 86c  
 Platoro-Summitville district: Patton, 18  
 Rico Mountains: Cross, 00, 00a, 05a  
 San Juan Mountains: Atwood, 18; Howe, 09  
 Slumgullion mud flow: Cross, 09b  
 Telluride region: Cross, 96c, 99
- General: Hovey, 14a; Howe, 13; Mitchell, 10
- Idaho, Thunder Mountain: Baumgarten, 10
- In unconsolidated sediments: Newland, 16a
- Maine, Portland region: Bouvé, 57; Hitchcock (C H), 74g; Jackson, 57a; Morse, 69
- Massachusetts, Mount Greylock and Briggsville: Cleland, 02
- Montana: Henton, 07
- New Hampshire, Mount Lafayette: Hitchcock (E), 52
- Passaconaway: Perkins (G H), 70
- White Mountains: Hitchcock (C H), 85b, c
- New Mexico, Chaco Canyon: Dodge (R E), 02
- New York: Coxsackie: Dwight, 66a  
 Hudson clays: Newland, 09a  
 Hudson Valley: Newland, 16a
- North Carolina: Holmes (J S), 17
- Ohio: Hubbard (G D), 08b; near Cleveland: Van Horn (F R), 09
- Ontario, Brantford: Spencer (J W), 85, 87a
- Panama Canal: Branner, 16b; Cornish, 13a;  
 Goethals, 16; MacDonald (D F), 12c, d, e, 13e, 15, 16, 16a; Miller (B L), 17a; Van Hise, 16; mechanics: Becker, 16
- Quebec, Blanche River: Chalmers, 99  
 Lievre River: Barlow, 05a; Ells, 04e
- Montreal region: Logan, 46b
- Notre-Dame de la Salette: Ells, 08b
- Portneuf Co.: Dawson (G M), 00b
- St. Alban: Laflamme, 95, 00
- Ste. Anne: Laflamme, 98
- St. Lawrence Valley: Chalmers, 00
- Vincennes: Laflamme, 00a
- Virginia, Mount Vernon: Darton, 15c
- Washington, Cascade Mountains: Russell, 00;  
 Mount Stuart quadrangle: Smith (G O), 00c
- Wyoming, Gros Ventreslide: Blackwelder, 12b;  
 Wind River Mountains, Bull Lake Creek rock slide: Branson, 17a
- Langley field, Hampton quadrangle, Virginia: Stephenson, 18a
- Langton, D. W., biography: Smith (E A), 10
- Lansing deposit, Kans.: Shimek, 04a
- Lansing skeleton. *See* Man (fossil)



- Lapham, I. A.**, biography: Mann, 76; Winchell (N H), 94a
- Lapis lazuli**, California: Sur, 13
- La Plata folio**, Colo. (no. 60): Cross, 99a
- Laramie Basin**, Wyo.: Darton, 09f; Siebenthal, 06a, b, 07a
- Laramie beds**: Peale, 09; Stanton, 97; Veatch (A C), 07; age: Bannister, 79; Cope, 90c; Gardner (J H), 80; Marsh, 96e; Schimper, 79; Stevenson, 90b; Ward (L F), 90; relations to Puerco: Cope, 85u; stratigraphic position: Cope, 78t
- Laramie flora**: Ward (L F), 87; White (C A), 83p; western Canada: Dawson (J W), 86e
- Laramie formation**: Bowen (C F), 16; Cross, 08b, 09; Hay (O P), 03c; and Shoshone group: Cross, 09
- Laramie group**: Neumayr, 84; Newberry, 89b; Peale, 79b; Stevenson, 81, 81a; White (C A), 78b, 83m, p, 88b
- Laramie Mollusca**: White (C A), 86a
- Laramie region**, Wyo.: Blackwelder, 09a
- Laramie Peak copper district**, Wyo.: Beeler, 04a
- Laramie-Sherman folio**, Wyo. (no. 173): Darton, 10c
- Lardeau district**, B. C.: Brock, 04b, 08a; Emmens, 10
- Larder Lake district**, Ont.: Brock, 07; Wilson (M E), 12
- Lassen Peak**, eruptions: Diller, 14c
- Lassen Peak folio**, Cal. (no. 15): Diller, 95
- Latrobe folio**, Pa. (no. 110): Campbell (M R), 04
- Laurentia**: Adams (F D), 09b
- Laurentian basin**, geological history: Russell, 93c
- Laurentian lakes**, origin: Upham, 96m
- Laurentian limestones**, mineralogy: Hunt, 67i; petrographical relations: Graton, 03a
- Laurentian rocks**, structure and origin: Adams (F D), 97c
- Laurentian series**: Logan, 60b
- Laurentian system**: Adams (F D), 83a, 95, 08a; Lane, 12e; Miller (W G), 11c; Whitney, 57
- Lava and lava flows**.
- Alaska, Bogosloff Island: Diller, 85c; Prince William Sound: Capps, 14a
- Aphrolith and dermolith**: Jaggar, 17c
- Arizona**, Fort Apache region: Reagan, 03b
- Grand Canyon: Walcott, 94
- San Franciscan field: Robinson (H H), 13
- California**, recent flows: Wright (G F), 05c
- Lassen Peak region: Diller, 87b
- northern: Diller, 91
- Plumas Co.: Turner, 92a
- Sierra Nevada: Ransome, 98; Turner, 15a
- southern, Morro Hill: Waring (G A), 17a
- Central America**: Marx, 68
- Classification**: Shaler, 80a
- Colorado**: Bailar, 08; Hills, 95a
- Bonanza district, Saguache Co.: Patton, 16
- Lay: Gale, 08
- Connecticut, Meriden: Davis (W M), 96a
- Cooling of a lava surface**: Day (A L), 17b
- Elastic limit**: Becker, 85c
- Ellipsoidal lavas**, Glacier National Park, Mont.: Burling, 16a; Prince William Sound, Alaska: Capps, 15d
- Lava and lava flows—Continued.**
- General: Buttram, 14; Daly (R A), 11; Iddings, 14; Lewis (J V), 14
- Great Basin region: Spurr, 00a
- Hawaii: Brigham, 09; Brun, 13; Cohen, 80; Cross, 11a, 13, 15; Daly (R A), 11b; Dana (J D), 87e, 89b; Ferguson, 14; Goodrich, 33; Heim, 13; Jackson, 46b; Lyman (C S), 49; Lyons (A B), 96; Maxwell, 98
- Kilauea lava lake, thermal gradient: Jaggar, 17d
- Mauna Loa: Coan, 57; Kahuku flow: Wood, 16c
- Idaho: Clearman, 04; Snake River plains: Russell, 02a
- Iowa, northwestern: Beyer, 93
- Lassen Peak lava, viscous nature: Diller, 17c
- Martinique: Diller, 02d
- Massachusetts, Holyoke range: Emerson (B K), 86
- Mexico Coyoacan, lava field: Wittich (E), 10h
- Nevada, Bullfrog district: Ransome, 10c
- Newark system: Darton, 89a
- New Mexico: Dutton, 84d, 85a
- Nomenclature of metamorphic lavas: Turner, 97b
- Oregon, Cascade Mountains: Condon, 79; Smith (W D), 17
- Origin: Daly (R A), 16a; Hobbs, 12a
- Pacific region: Redway, 01; Wright (G F), 93j
- Pillow lava, origin: Lewis (J V), 14; Watchung Mountains, N. J.: Lewis (J V), 15b
- Plateau region: Reagan, 03a
- St. Vincent: Diller, 02d
- Streams, cause of turning: Niles, 84
- Tunnels: Hobbs, 14c
- Washington, southeastern: Russell, 97b
- Western States: Gilbert, 75d; LeConte, 73a
- Wyoming, Absaroka Range: Hague, 99c
- Laws of jointing: Stevens (B), 13b
- Lawton oil and gas field, Okla.: Wegemann, 15f
- Leaching of Pleistocene drifts, Iowa: Leighton, 15
- Lea, Isaac, biography: Anon, 86a
- Lead. *See also names of lead-producing States.*
- Canada: Ingall, 98a
- Eastern States: Dunlop, 15
- Enrichment of ore deposits: Emmons (W H), 17
- General: Joseph, 16f; Kirchhoff, 83a; Siebenthal, 08c
- Mississippi Valley: Bain, 06, 07; Bell (W H), 44; Buckley, 07a, c; Cox (G H), 11; Jaines (E), 27; Jenney, 94; Keyes, 02d; Phillips (J V), 54; Van Hise, 01a, 02b; Whitney, 59a; Wright (C A), 18
- Ores, classification: Fulton (C H), 16; in sandstone and shale: Lindgren, 11a
- United States: Bain, 05d; Ingalls, 08; Lindgren, 09b; Siebenthal, 16, 17, 17a; U S G S, 83
- Leadhillite, crystallography of: Palache, 09a, 10a
- Leadville. *See Colorado.*
- Leaf-rafts: Berry, 06i
- Le Claire limestone: Calvin, 96a
- Le Conte, Joseph, biography: Christy, 02; Fairchild, 15; Hilgard, 06c; Lawson, 01; Le Conte, 03; Stevenson, 02a
- Lectures on geology: Lyell, 42



- Leeward Islands:** Cleve, 71  
**Leidy, Joseph, biography:** Brooks (W K), 07; Chapman, 07; Frazer, 02; Minot, 13; Osborn, 13d; Ruschenberger, 92  
**Leidyosuchus:** Lambe, 07  
**Leidyosuchus sternbergi, Ceratops beds, Wyo.:** Gilmore, 10  
**Leipsig district, N. S.:** Moore (P H), 09  
**Lemuroidea, classification and phylogeny:** Gregory (W K), 15b  
**Leona rhyolite, Cal.:** Clark (C W), 17  
**Lepadidae, derivation:** Clarke (J M), 18e  
**Lepadocystis clintonensis:** Parks, 10a  
**Lepidostrobos:** Coulter, 11; Tilton, 12  
**Leptaenisca:** Beecher, 90b  
**Leptaretus:** Wortman, 94a  
**Leptauchenia decora, restored skeleton:** Sinclair, 10a  
**Leptoceratops, Alberta:** Brown (B), 14d  
**Leptomeryx:** Scott (W B), 91c  
**LeRoy, O. E., biography:** Schofield, 18  
**Lesley, J. P., biography:** Ames, 09; Chance, 06; Davis (W M), 15e; Frazer, 03; Halberstadt, 03; Lyman, 03a; Stevenson, 03a, 04a  
**Lesquereux, Leo, biography:** Lesley, 90c, 95; Orton, 90b  
**Letchworth Park:** Grabau, 07j  
**Leucite Hills, Wyo.:** Kemp, 97a, 03  
**Leurospondylus:** Brown (B), 13d  
**Leverett, Frank, biography:** Keyes, 00j  
**Lewis, H. C., biography:** Upham, 88b, 89c; Woodward (H), 88  
**Lewiston coal field, Mont.:** Calvert, 09, 09a  
**Lichenaria:** Sardeson, 99b  
**Life, origin of:** Chamberlin (T C), 08  
**Lighthouse granite, Conn.:** Ward (F), 09  
**Lignilites:** March, 68b  
**Lignite. See also Coal.**  
     *Burning in situ:* White (C A), 83o  
     *Constitution and genesis:* Thiessen, 13  
     *Formation:* Lesquereux, 73, 74c  
     *General:* Dawson (G M), 74a; Nystrom, 08  
     *Great Plains region:* Hayden, 66c, 69c  
     *Hudson Bay region:* Bell (R), 96b  
     *Northwest:* Pumpelly, 86a  
     *United States:* Holmes (J A), 11  
     *Western States:* Eilers, 73; Newberry, 74i  
**Lignite beds and underclays:** Hilgard, 74  
**Lignitic formation, Rocky Mountains, age:** Lesquereux, 73b, 74e, 76c; Meek, 74c; Stevenson, 75c  
**Lignitic group:** Hayden, 74a, 76  
**Lillooet mining division, B. C.:** Camsell, 12a  
**Limestone (general).**  
     *Algal agency in formation:* Walcott, 14  
     *Classification:* Grabau, 03a  
     *Crystalline:* Hunt, 54b  
     *Evolution:* Daly (R A), 09; Steidtmann, 11  
     *Formation:* Dana (J D), 52c, 53c; Horsford, 52; Jackson, 54a  
     *General:* Burnham, 83; Culin, 17; Emmons (E), 47; Hopkins (T C), 93; Hunt, 54b; Smith (R A), 16  
     *Laurentian:* Ingall, 94  
     *Magnesia in limestone:* Loughlin, 16b  
**Limestone (general)—Continued.**  
     *Microscopic structure:* Dawson (J W), 59d; Grimsley, 93  
     *Mottled limestones, origin:* Van Tuyl, 16c  
     *Occurrence:* Stone (R W), 13a  
     *Origin:* Dale, 14; Daly (R A), 16a; Emmons (E), 47; Hunt, 62b; McCallie, 94  
     *Phosphorescent limestone:* Lewis (H C), 84d  
     *Pre-Silurian, origin:* Daly (R A), 13  
     *United States:* Burchard, 14  
**Limestone solution on bottom of Lake Ontario:** Kindle, 15c  
**Limnohyops:** Earle, 92  
**Limnoscelis:** Williston, 12a  
**Linear force of growing crystals:** Becker, 16a  
**Lingulepis:** Walcott, 97b  
**Lithia minerals.**  
     *California:* Aubury, 06  
     *General:* Hess, 10d, 11; Pratt, 02a; Schaller, 17c  
     *South Dakota, Black Hills:* Anderson (A A), 12; Ziegler, 13a  
**Lithogenesis of sediments:** Grabau, 17b; Van Tuyl, 16h  
**Lithographic stone.**  
     *Iowa, Mitchell Co.:* Hoen, 03  
     *Kentucky, eastern:* Ulrich, 02a  
     *United States:* U S G S, 83  
**Lithological nomenclature:** Chamberlin (T C), 82a  
**Lithology (general). See also Petrology.**  
     *Classification of rocks:* Grabau, 03e  
     *Bayley, 15; Dana (J D), 78b; Stockbridge, 88*  
     *Manual:* Williams (E H), 86  
**Lithophysae:** Iddings, 88  
**Lithothamnidae, Panama Canal Zone:** Howe, 18  
**Little Belt Mountains folio, Mont. (no. 56):** Weed, 99a  
**Little Black Mountain coal field, Va.:** Fisher (C A), 09b  
**Little Colorado Valley:** Ward (L F), 01  
**Little Lake district, Mich.:** Allen (R C), 14  
**Little Powder River coal field, Campbell Co., Wyo.:** Davis (J A), 12  
**Little River group:** Matthew (G F), 10a-c; flora: Matthew (G F), 94e, 06, 10b  
**Little Rocky Mountains, Mont.:** Emmons (W H), 08b  
**Little Sequatchie coal field, Tenn.:** Killebrew, 76a  
**Little Sheep Mountain coal field:** Rogers (G S), 13  
**Little Snake River coal field, Wyo.:** Ball (M W), 09, 10  
**Littoral physiographic features:** Vaughan, 16c  
**Livermore Valley, Cal.:** Branner, 12a, b; Lawson, 12g  
**Livingston coal field, Mont.:** Calvert, 12a  
**Livingston folio, Mont. (no. 1):** Iddings, 94  
**Livingston formation, Mont.:** Stone (R W), 10  
**Llano-Burnet region, Tex.:** Paige, 11, 12  
**Llano Estacado, northern:** Baker (C L), 15  
**Lokatong formation:** Hawkins, 14  
**Locke, John, biography:** Winchell (N H), 94d  
**Locus of vadose ore deposition:** Keyes, 09g  
**Loess.**  
     *Analysis:* Knight (N), 02  
     *Arkansas:* Salisbury, 91a; Crowley's Ridge Shimek, 16  
     *Bibliography:* Cable, 16



## Loess—Continued.

- Characteristics: Chamberlin (T C), 91; Gow, 13; Pumpelly, 79; Sardeson, 99a; and age: Leighton (M M), 17b
- Eolian loess: Todd, 18b
- Eolian origin: Keyes, 98h; Shimek, 11b; Udden, 97
- Fossils in loess: Witter, 79b; distribution: Shimek, 99
- Fresh-water shells: Shimek, 04e
- General: Call, 82; Chamberlin (T C), 90; Hay (O P), 14; Hicks, 90a; McGee, 83d; Reagan, 08a; Sardeson, 98b; Shaw (E W), 14a; Shimek, 04, 12c; Todd, 98b; Tomlinson, 18; Winchell (N H), 03a
- Illinois: Holmes (N), 68
- Canton quadrangle: Savage, 17
- northwestern: Carman, 09
- St. Louis area: Fenneman, 09
- western: Leverett, 96c
- Iowa: Shimek, 90, 04b
- Burlington: Keyes, 88g
- Des Moines, Capitol Hill, Pleistocene: Lees, 16a
- eastern: Carman, 09; McGee, 84
- Muscatine Co.: Witter, 79a
- northeastern: McGee, 91
- southeastern: Leverett, 96c
- southwestern: Willcox, 04
- Louisiana: Emerson (F V), 18
- Marl-loess, Wabash Valley: Fuller, 03e
- Minnesota, eastern: Hall (C W), 99a
- Mississippi Valley: Chamberlin (T C), 91; Hershey, 97g; Hilgard, 79a, b; Shimek, 08a; Todd, 97a
- Missouri: Holmes (N), 68; Todd, 96a; St. Joseph: Owen (L A), 04
- Missouri River region: Todd, 79; origin: Todd, 06a
- Missouri Valley: Wright (G F), 03d, 04
- Mollusca in loess: Owen (L A), 05; Shimek, 98
- Montana: Shaler, 99b
- Origin: Agassiz (L), 67; Broadhead, 79, 04a; Campbell (J T), 89; Carman, 09; Chamberlin (T C), 97b; Child, 80; Cope, 82zd; Free, 11; Hilgard, 79a, b; Keyes, 12; Newberry, 88e; Owen (L A), 01, 05; Pumpelly, 79; Savage, 16c, 17; Shaw (E W), 14a; Shimek, 96, 98, 04c, 07, 08c, 10; Todd, 79, 97b, 98b; Trowbridge, 16; Udden, 97, 97a, 98; Wright (G F), 05; and distribution: Leverett, 04c
- Indiana, southwestern: Shaw (E W), 15b
- Missouri upland: Hershey, 00a
- Shearing planes, horizontal: Udden, 02a
- Slopes: Hilgard, 84f
- Types in Mississippi Valley: Shimek, 16a
- Lodes, veins, and beds, irregularities: Kohler, 87
- Loelaps, skull: Cope, 92c
- Logan, W. E., biography: Bell (R), 08; Harrington, 76a, 83
- London folio, Ky. (no. 47): Campbell (M R), 98a
- Long Island, N. Y.: Crosby, 08; Veatch (A C), 06c; watercourses: Lewis (E), 77, 77a
- Long Lake gold mine, Sudbury district, Ont.: Baker (M B), 17
- Long Lake quadrangle, N. Y.: Cushing, 07
- Lonsdale, E. H., biography: Keyes, 98d
- Loon Creek district, Idaho: Umpleby, 13a
- Lopolith: Grout, 18a
- Lorandite from the Rambler mine, Wyo.: Rogers (A F), 12b
- Lordsburg district, N. Mex.: Fry (E D), 10; Jones (F A), 07
- Los Angeles oil district, Cal.: Eldridge, 07
- Lost rivers: Harrington (M W), 85
- Lost Packer lode, Idaho: Jennings, 06
- Lost Spring coal field, Converse Co., Wyo.: Winchester, 12
- Loudon folio, Tenn. (no. 25): Keith, 96
- Loughridge, R. H., biography: Smith (E A), 18
- Louisiana.
- Blue clay of Mississippi River: Little, 82
- Catahoula Parish: Kilpatrick, 52
- Delta: Hilgard, 71
- General: Carpenter (W M), 39; Forshey, 52; Nutt, 32a; Peck, 51; Robertson (J B), 67; Thomassay, 60
- Jennings sheet, cartography: Harris (G D), 07a, New Orleans: Dowler, 51
- Red River raft: Bringier, 21
- Red River raft region: Collins (H C), 73
- Salines as geologic chronometer: Lachmann, 12
- Soil geology: Hilgard, 84c
- Surveys: Harris, 99a
- Economic geology.*
- Belle Isle: Lucas (A F), 17
- Caddo oil and gas field: Hopper, 11; Matson, 16b
- Cement materials: Eckel, 13
- Clay: Clendenin, 98; Matson, 17; Ries, 99b
- Dome theory: Lucas (A F), 12a
- Eastern La.: Clendenin, 96
- General: De Bow, 52; Harris, 99a; Hopkins (F V), 70; Jones (J), 76; Robertson (J B) 67
- Iron, northern La.: Burchard, 15a; Johnson (L C), 88
- Loess deposits: Emerson (F V), 18
- Mounds of oil fields: Hager, 04
- natural gas: Harris, 10
- Caddo field: Hopper, 11; Matson, 16b
- De Soto-Red River field: Matson, 17a
- northern La.: Bates, 18a
- Northern La.: Lerch, 92, 93
- Northwestern La.: Harris, 09b
- Oil and gas: Harris, 10; in northwestern La.: Harris, 09b
- Oil concentration about salt domes: Harris, 12
- Oil fields: Wooton, 12a; Gulf Coastal Plain: Fenneman, 06a; Matteson, 18
- Petite Anse: Thomassy, 63
- Petroleum: Deussen, 18; Fenneman, 06a; Gardner (J H), 17; Harris, 02c, 10, 12; Lucas (A F), 12; Wooton, 12a
- Caddo field: Hopper, 11; Matson, 16b
- Coastal Plain: Fenneman, 05a, d; Hayes, 03a, h
- De Soto-Red River field: Matson, 17a
- northern La.: Bates, 18a
- northwestern La.: Harris, 09b
- Red River field: Bates, 18
- southwestern La.: Fishback, 02
- Petroliferous mounds, origin: Chautard, 15



## Louisiana—Continued.

*Economic geology*—Continued.

Rock salt: Harris, 08d, 09; Lucas (A F), 00;  
New Iberia: Owen (R), 66

Salines: Hilgard, 83

northern La.: Veatch (A C), 02

origin: Norton, 15

Salt: Harris, 08, 08b, 09; Lucas (A F), 12;  
Wooton, 12; Hilgard, 69b

Avery Island: Romeyn, 00; and Jefferson  
Island: Lucas (A F), 96

Five Islands: Veatch (A C), 99

northern La.: Veatch (A C), 02

Petit Anse Island: American Bur. Mines, 67;  
Bolton, 88; Hilgard, 69a, 72; Pomeroy, 88

Salt domes, intrusive origin: Rogers (G S),  
18a; structure: Lucas (A F), 18

Southwestern La.: Clendenin, 96

Sulphur deposits: Baldacci, 06; Burthe, 74;  
Pogue, 17c; Calcasieu Parish: Kerr, 02;  
Preussner, 88

Sulphur and sulphur oil of Coastal Plain:  
Lucas, 12

*Historical geology*.

Belle Isle: Lucas (A F), 17

Borings: Deussen, 18

Lake Borgne: Forshey, 75; Hilgard, 78

New Orleans: Edwards (A M), 70d; Hilgard, 70a

Caddo oil and gas field: Matson, 16b

Citronelle formation: Matson, 16

Coastal region: Kennedy, 17

De Soto-Red River oil field: Bates, 18; Matson,  
17a

Eastern La.: Clendenin, 96

Five Islands: Veatch, 99

General: Dana (J D), 72e; Harris, 99a, 02b;  
Hilgard, 69b, 70, 72a, 73; Hopkins (F V),  
69, 71, 72; Matson, 17; Stubbs, 95;  
Thomassay, 60; Veatch (A C), 05

Gulf Coastal Plain: Hayes, 03a

Jackson stage: Casey, 02

Jennings oil field: Harris, 02c

Lafayette beds: Harris, 08a; McGee, 08a

Loess deposits: Emerson (F V), 18

Lower La.: Hilgard, 69a, 72

Mississippi delta: Hilgard, 70

Mississippi embayment: Harris, 02a

Mississippi River: Little, 83

Mississippi River region: Clendenin, 97

Natchitoches area: Harris, 99b

Northern La.: Lerch, 92, 93; Veatch (A C), 05a,  
06e, g

Northwestern La.: Johnson (L C), 88; Vaughan,  
95, 96

Oligocene: Maury, 02

Ouachita region: Veatch (A C), 02b

Petite Anse: Thomassy, 63

Port Hudson: Carpenter (W M), 39a

Red River, Crichton oil field: Bates, 18

Sabine River region: Veatch (A C), 02a

Salines, north La.: Veatch (A C), 02

Salt domes: Harris, 08, 08c

Shreveport area: Veatch (A C), 99

Southern La.: Harris, 04a, 05

Southwestern La.: Clendenin, 96

Tertiary: Dumble, 02d; Heilprin, 84a; St.  
Maurice formation: Harris, 10a

## Louisiana—Continued.

*Historical geology*—Continued.

Tertiary correlation: Vaughan, 18d

Winfield area: Harris (G D), 07

*Mineralogy*.

General: De Bow, 52

Mercury in alluvium: Wilkinson, 85

*Paleontology*.

Basilosaurus: Harlan, 34a

Borings, Lake Borgne: Hilgard, 78

Catahoula sandstone flora: Berry, 16c

Cetacean: Riviere, 37

Cretaceous: Harris, 99c

Eocene: Harris, 99c

Fulgur, genesis: Maury, 09

Goniopteris claiborniana, Yegua formation:  
Berry, 17b

Mammalia, New Iberia: Leidy, 84; Petite Anse;  
Cope, 95f; Leidy, 89f

Northwestern La.: Vaughan, 96

Palmoxylon: Knowlton, 88b

Plantae, northwestern La: Hollick, 99c

Pliocene Mollusca: Dall, 13

Pontogeneus, Eocene: Leidy, 52g

Ptereulima, Eocene, St. Maurice: Casey, 02a

Vertebrate fossils: Carpenter (W M), 38; New  
Iberia: Leidy, 84c

*Physical geology*.

Delta of Mississippi: Shaw (E W), 14b, c;  
Thomassy, 60b

Intraformational conglomerate and breccia,  
Shreveport: Emerson (F V), 16

Mud lumps, Mississippi delta: Hilgard, 70c, 71;  
Shaw (E W), 13, 14; Simons, 82

Nita crevasse: Johnson (L C), 91

Red River, Crichton oil field: Bates, 18

Sand waves: Hider, 83

*Physiographic geology*.

Coastal region: Kennedy, 17; Sutherland, 08

Eastern La.: Clendenin, 96

General: Hilgard, 84c

Great Raft: Veatch (A C), 99

Mississippi delta: Shaw (E W), 14c

Mississippi River region: Clendenin, 97

Natural mounds, origin: Veatch (A C), 05b

Northern La.: Davis (W M), 07; Lerch, 92, 93

Ouachita region: Veatch (A C), 02b

Prairie mounds: Hilgard, 05

Sabine River region: Veatch (A C), 02a

Shreveport area; Veatch (A C), 99

Southwestern La.: Clendenin, 96

*Underground water*.

Artesian water: Harris, 02b

General: Harris, 02b; Veatch (A C), 05

Northern La.: Veatch (A C), 05a, 06c, g

Southern La.: Fuller, 04a; Harris, 04a, 05

Loup rivers: Hicks, 92a

Loup Fork group: Sternberg, 82

Lower Helderberg formation: Hall, 74b

Lower Silurian. *See* Ordovician.

Loxolophodon: Cope, 73zn; Osborn, 79, 81

Lucas, A. F., biography: McBeth (R S), 18

Lunar craters: Hayes (E), 03; formation: Gilbert,  
93c

Lundy beach: Spencer (J W), 94d

Luray copper deposits, Va.: Phalen, 06a

Lykins fauna: Girty, 12



Lymnaea: Baker (F C), 09.

Lyon Mountain magnetite ores, N. Y.: Newland, 06c

Lysorophidae: Moodie, 09

Lysorophus: Case, 02a, 08; Huene, 13b; Williston, 08c

McAlester coal field, Okla.: Brown (G M), 13

McCalley, Henry, biography: Smith (E A), 05c, 06

McDonald deep well, Pa.: White (I C), 13a

Macclognatha: Marsh, 84a

Macfarlane, James, biography: White (I C), 91a

Machine-made line drawings: Daly (R A), 05c

Mackay copper deposits, Idaho: Umpleby, 14b

Mackenzie.

Coppermine country: Tyrrell, 12

Peel River region: Camsell, 06, 06b

McKinley Lake district, Alaska: Chapin, 13

McKittrick-Sunset oil region, Cal.: Arnold, 10a

Maclure, William, biography: Morton, 41, 44

Macmillan River, Yukon district: McConnell, 03

McMinnville folio, Tenn. (no. 22): Hayes, 95c

McPherson Equus beds, Kans.: Haworth, 97b

Macropetalichthys: Eastman, 97d

Madill oil pool, Okla.: Taff, 09c

Magdalen Islands: Baddeley, 33; Clarke (J M), 11b; Richardson (J), 81; carbonic fauna: Beede, 11

Magdalena district, N. Mex.: Argall, 08a; Statz, 12c; Tuttle, 12

Magmas and magmatic differentiation. *See also* Intrusions; Laccoliths; Lavas.

Abyssal igneous injection: Daly (R A), 06b

Acidic magmas: Stevens (B), 04b

Adirondack region: Miller (W J), 14b, 18b

Alkaline rocks, genesis: Daly (R A), 10a, 18

Anorthite-forsterite-silica system: Andersen, 15

Anorthosites, origin: Bowen (N L), 17a

Arizona, Silverbell: Stewart (C A), 13

Assimilation: Bascom, 15a

Auvergnose rocks, size of grain: Lane, 06a

British Columbia, Franklin mining camp, West Kootenay: Drysdale, 15

Black Hills, granite intrusion: Paige, 14c

Connecticut, Litchfield sulphide-bearing rocks: Howe (E), 15

Convection: Grout, 18c

Cordillera, forty-ninth parallel: Daly (R A), 13

Corundum, formation: Pratt, 99a

Crystallization, in differentiation: Bowen (N L), 15a, c

in igneous rocks: Hague, 85

Differentiation, causes: Bäckström, 93

in intercrustal magmatic basins: Harker, 16

of a basaltic magma: Fenner, 10

order of: Bowen (N L), 12b; Ziegler, 13

Diffusion in silicate melts: Bowen (N L), 16

Dikes: Kemp, 07g

Duluth rocks: Grout, 18e

Formation: Wilson (E B), 12

Fractional crystallization: Harker, 13

Gases, magmatic: Day (A L), 13a; Meunier, 14

General: Becker, 97a, b; Daly (R A), 13d, 14, 15b; Harker, 13; Hunt, 58a, 78b; Iddings, 96a, 14, 14a; Keyes, 02g; Lane, 08i; Loughlin, 16a; Stevens (B), 03a, 12b; Walker (T L), 98; Winchell (N H), 98c

Grain in igneous rocks, variation: Queneau, 02

Magmas and magmatic differentiation—Contd.

Granitic dikes: Lane, 08b

Granitization, regional: Sederholm, 13a

Gravitational assemblage in granite: Gilbert, 06b

Gravitative adjustment in magmas: Daly (R A), 06

Harney Peak region: Ziegler, 14a

Hawaii: Daly (R A), 11b

Igneous intrusion, methods: Becker, 07; Cross, 07c; Day (A L), 07a; Lawson, 07; Lindgren, 07c; Smith (G O), 07c; Wright (F E), 07b

Igneous rocks, evolution stages: Bowen (N L), 15b

Kilauea, cyclical variation in eruption: Wood (H O), 17b

Kilauea lava lake, thermal gradient: Jaggar, 17d

Lake Superior region: Lane, 99c

Lava maculae: Hobbs, 13

Laws of igneous emanation pressure: Stevens (B), 12a

Lime-alumina-silica system: Rankin, 16

Liquefaction of rocks: Hunt, 70g

Magmatic emanations: Lincoln, 07

Magmatic gases: Day (A L), 13a; Meunier, 14

Magmatic waters and volcanic action: Hixon, 08c

Marysville district: Barrell, 07

Mechanics of intrusion: Daly (R A), 03, 03a; Paige, 16a

Mexico: Philippi, 07

Molten magma: Clarke (F W), 08

Montana, Boulder batholith: Billingsley, 15

Highwood Mountains: Johnston-Lavis, 96

New Jersey, Highlands: Fenner, 14

Occlusions of igneous rock: Julien, 06

Okanagan composite batholith: Daly (R A), 06a

Ore genesis: Singewald, 17b; Stevens (B), 04

Ore segregation: Kemp, 03f; Tolman, 16

Ore shoots and magmatic differentiation: Pope, 11

Origin of augite andesite: Daly (R A), 08

Palisade diabase, intrusion temperature: Sosman, 13

Pegmatites of Duluth gabbro: Grout, 18

Phase rule and igneous magmas: Read, 05

Pigeon Point, Minn.: Daly (R A), 17b

Pressure in formation of rocks and minerals: Johnston (J), 15

Primary and secondary magmas: Stevenson (R), 03

Quartz veins of Silver Peak, Nev.: Hastings, 06

Resorption phenomena in igneous rocks: Fenner, 10c

Rock segregation and ore deposition: Stevens (B), 03a

Segregation under action of gravity: Day (A L), 16

Silicate liquids, differentiation: Bowen (N L), 15

Solidification of alloys and magmas: Aston, 09

Triassic basalt, Cape d'Or, Nova Scotia: Powers, 16a

Variability in rock magma: Turner, 02c



**Magmas and magmatic differentiation—Contd.**

- Varying degrees of superfusion, influence on magmatic differentiation: Lane, 06b  
 Vermont, Ascutney Mountain: Daly (R A), 03; Cuttingsville: Eggleston, 18  
 Volcanic action, nature: Daly (R A), 11a  
 Water as a magmatic constituent: Morey, 16  
 Western Nevada: Spurr, 05d  
 Magmatic sulphide ores: Tolman, 16  
 Magnesian rocks, origin: Hunt, 57g  
 Magnesian series of Northwest: Hall (C W), 95, 05a  
 Magnesite.  
   Arizona: Culin, 16  
   British Columbia, Bridge River district: Drysdale, 17a; Pacific Great Eastern Railway: Camsell, 18b  
   California: Aubury, 06; Hess, 06a, 08f; Yale, 13, 16a; Bissell: Palmer (L A), 16c  
   Canada: Fréchette, 17; Malcolm, 18  
   General: Culin, 16; Gale, 12c; Hamilton, 18; Morganroth, 14; Spinks, 04; Yale, 04a, 13, 16a, 17  
   Nova Scotia, Inverness Co.: Hayes (A O), 17  
   Origin and geochemistry: Dolbear, 17  
   Quebec, Grenville district: Fréchette, 11; Wilson (M E), 17, 17a, c  
   United States: Gale, 12c; Hess, 16; Yale, 13f  
   Washington: Stone (R W), 18, 18a; Valley: Jenkins, 18a  
 Magnetic disturbances and the genesis of petroleum: Becker, 09  
 Magnetic phenomena around deep borings: Lane, 04a  
 Magnetic rocks: Harris, 09a; Arizona and California: Hanks, 90  
 Magnetic surveys of magnetite deposits of Duluth gabbro: Broderick, 18  
 Magnetism of minerals and rocks: Smock, 76  
   New Jersey, franklinite vein: Farrington, 52  
 Magnetite. *See* Iron.  
 Magothy flora: Berry, 07f, 15a  
 Magothy formation on Atlantic islands: Bibbins, 10, 10a; Maryland: Darton, 93b  
 Maine.  
   Androscoggin Co.: Merrill (G D), 91  
   Aroostook River region: Holmes (E), 39  
   Bibliography: Babb, 13  
   Blazing beach, Kittery Point: Penhallow, 05c  
   Boulder with Devonian fossils: Jackson, 61a; Rogers (W B), 61d  
   Brunswick and Topsham: Carmichael, 78  
   Fish River lakes: Packard (A S), 61  
   General: Emmons (E), 36; Holmes (E), 61b; Jackson, 38b; Pressey, 02a  
   Geological surveys, history: Bayley, 90; reports: Me St S Comm, 07  
   Isles of Shoals: Hovey (H C), 95, 95a  
   Kennebec River basin, geology: Smith (G O), 07f  
   Moosehead Lake region: Houghton (J C), 61  
   Mount Desert Island: Morse (E S), 14  
   Mount Katahdin: Bailey (J W), 37  
   Penobscot River basin: Bastin, 12a  
*Economic geology.*  
   Building stone: Merrill (G P), 83c; Shaler, 84a; microscopic characters: Merrill (G P), 82  
   Cement materials: Eckel, 13

**Maine—Continued.***Economic geology—Continued.*

- Clays, Penobscot Bay region: Bastin, 06b; Portland region: Katz, 13a  
 copper: Emmons (W H), 10a; Weed, 11  
   Blue Hill deposits: Emmons (W H), 09  
   Deer Isle mine: Emmons (W H), 09  
 Eastport quadrangle: Bastin, 14  
 Feldspar deposits: Bastin, 07, 10, 11; Watts (A S), 16  
 Gem deposits: Bastin, 11  
 General: Burr (F F), 17; Hitchcock (C H), 61; Jackson, 37, 37a, 38, 38a, 39  
 Gold, Hancock Co.: Wadsworth, 81a  
 Granites: Dale, 07; Smith (G O), 07a; Villarello, 09a  
   North Jay: Wadsworth, 77a  
   Penobscot Bay quadrangle: Smith (G O), 05b, 07d  
   Rockland quadrangle: Bastin, 08a  
 Graphite, occurrence: Smith (G O), 06, 06a  
 Infusorial deposit, Newfield: Jackson, 41b  
 Iron: Benton, 86a; Knox Co.: Bastin, 06a  
 Lead: Emmons (W H), 10a  
 Mica: Bastin, 11  
 Mineral prospect: Smith (G O), 07b  
 Mineral resources: Lee (L A), 05  
 Molybdenum deposits: Hess, 08b; Smith (G O), 05a; Tunk Pond: Hills (B W), 09  
 Peat deposits: Bastin, 08a, 09a; Livermore quadrangle: Burr (F F), 17  
 Penobscot Bay quadrangle: Smith (G O), 07d  
 Pyrrhotite, central Me.: Bastin, 17b  
 Quartz: Bastin, 07; Smith (G O), 04a  
 Rockland quadrangle: Bastin, 08a  
 Silver: Emmons (W H), 10a  
 Slate: Dale, 06c; new variety: Dale, 06b  
 Sullivan district: Kempton, 79  
 Tin, Winslow: Hunt, 73b; Jackson, 69, 69a  
 Tourmaline deposits: Wade, 09  
 Zinc: Emmons (W H), 10a  
*Historical geology.*  
 Allagash section, Penobscot to St. Lawrence River: Hodge (J T), 38  
 Ames Knob, North Haven: Willis, 03a  
 Androscoggin River headwaters: Huntington, 78  
 Aroostook Co.: Bailey (L W), 88a; Gregory (H E), 00  
 Auburn, rock formations: Merrill (G P), 84b  
 Brunswick region: Cleveland, 09  
 Chapman sandstone: Williams (H S), 16  
 Coast: Johnson (S N), 69  
 Cobscook Bay district: Shaler, 86  
 Devonian, Somerset Co.: Clarke (J M), 09a  
 Dikes, Kennebunkport: Kemp, 90  
 Eastern Me.: Bailey (L W), 90b  
 Eastport: Rogers (W B), 60  
 Eastport quadrangle: Bastin, 13c, 14  
 Eruptives, Androscoggin Co.: Merrill (G P), 92  
 Fox Islands: Smith (G O), 96, 02a  
 Frenchmans Bay: Crosby, 81a  
 General: Hitchcock (C H), 61, 62a, 68e, 85; Jackson, 37, 37a, 38, 38a, 39; Matthew, 70; True (N T), 81  
 Metamorphic rocks, age: Matthew, 70  
 Monhegan Island: Lord, 00a



## Maine—Continued.

*Historical geology*—Continued.

- Mount Desert Island: Chapman (H C), 93;  
Davis (W M), 81, 94e; Shaler, 89a  
Mount Katahdin district: Hamlin, 81; Harvey  
(L H), 03  
Mount Mica, Oxford Co.: Hamlin, 95  
Northern Me.: Hitchcock (C H), 61a, 62  
Northwestern Me.: Hitchcock (C H), 74h  
Oriskany formation, Parlin Stream: Pirsson, 14  
Pegmatites and associated rocks: Bastin, 11  
Penobscot Bay quadrangle: Smith (G O), 07d  
Perry area: Rogers (W B), 59b  
Perry basin, southeastern Me.: Smith (G O), 05  
Perry sandstone, age: Rogers (W B), 61c  
Portland region: Hitchcock (C H), 74g; Hitch-  
cock (E), 36b  
Portland and Casco Bay quadrangles: Katz, 13  
Post-Tertiary: De Laski, 66  
Rockland quadrangle: Bastin, 08a  
Schoolic region: Hitchcock (C H), 62  
Silurian, Dennis River: Rogers (W B), 61e  
northern Me.: Bailey (L W), 87a  
Penobscot Bay: Dodge (W W), 92  
Southern Me.: Hitchcock (C H), 62  
Southwestern Me.: Katz, 17a  
Volcanic series, Fox Islands: Smith (G O), 95

*Mineralogy*.

- Allanite, Topsham: Robinson (F C), 84  
Amblygonite, Hebron: Brush, 62  
Andalusite, Gorham: Kunz, 84b  
Apatite, Minot: Wolff, 02  
Apatite crystal, Auburn: Ford (W E), 17a  
Auburn, Oxford Co.: Kunz, 84a  
Bertrandite, Stoneham: Kunz, 88c; Penfield, 89  
Beryl, Oxford Co.: Kunz, 84e  
Beryllonite, Stoneham: Dana (E S), 88a, 89a  
Brunswick and Topsham: Carmichael, 78  
Catalog of minerals: Harvey, 88  
Childrenite, Hebron: Brush, 63b; Cooke (J P),  
63  
Columbite: True (N T), 82  
Cookeite: Brush, 66; Paris and Hebron: Pen-  
field, 93  
Feldspar, Mount Desert: Jackson, 59k  
Garnet, striated, Buckfield: Bayley, 92d  
General: Bement, 88  
Haddam: Martin, 01  
Hamlinite, Oxford Co.: Penfield, 97c; Stone-  
ham: Hidden, 90a  
Herderite, Auburn: Ford (W E), 11  
Hebron: Wells, 92  
Paris: Penfield, 94  
Oxford Co.: Hidden, 84  
Stoneham: Dana (E S), 84b; Genth, 84  
Litchfield: Clarke (F W), 86a, 87; Jackson, 45e;  
Whitney, 47b  
Manganotantalite: Schaller, 07a  
Meteorite, Andover: Kunz, 98; Ward (H A),  
02a, 03a  
Castine: Shepard, 48a  
Searsmont: Shepard, 71a; Smith (J L), 71  
Waterville: Wadsworth, 83  
Mineral localities: True (N T), 69  
Mount Mica, Oxford Co.: Hamlin, 95; Leidy,  
72a; and Mount Apatite: Manchester, 18  
Phenacite: Yeates, 90

## Maine—Continued.

*Mineralogy*—Continued.

- Pollucite, Hebron: Wells, 91  
Rumford: Foote (H W), 96  
Stoneham, Oxford Co.: Kunz, 84  
Sundry minerals: Warren, 98  
Topaz, Stoneham: Clarke (F W), 85, 86; Kunz,  
84  
Tourmaline: Hamlin, 73  
Auburn: Hidden, 84a; Kunz, 84a;  
Mount Mica: Hamlin, 95  
Oxford Co.: Kunz, 86k

*Paleontology*.

- Aroostook Co.: Clarke (J M), 00g; Williams  
(H S), 00  
Brachiopod, new: Williams (H S), 07  
Cambrian: Hitchcock (C H), 62b  
Chapman sandstone fauna: Williams (H S), 16  
Devonian: Clarke (J M), 07a  
Plantae, Perry: Dawson (J W), 61c, g, 62a, d,  
63b  
Somerset Co.: Clarke (J M), 09a  
Diatomaceae: Bailey (L W), 62  
Eastport quadrangle, Paleozoic faunas:  
Williams (H S), 12b; Silurian fauna:  
Williams (H S), 13b  
Glacial fossils: Sherman, 73  
Graptolites, Penobscot Co.: Dodge (W W), 90  
Mink from shell-heaps: Loomis, 11a  
Mollusca, marl deposits, Aroostook Co.: Ny-  
lander, 01; Quaternary, Westbrook:  
Mighels, 42  
Nuculites, Silurian, Washington Co.: Williams  
(H S), 17  
Ophiuroids in glacial clay: Sayles, 09  
Ordovician, Penobscot Co.: Dodge (W W), 81  
Oriskany fauna, Parlin Stream: Pirsson, 14  
Ostracoda, post-Tertiary: Brady, 71  
Perry, Devonian: Hitchcock (C H), 62a  
Perry basin, southeastern Me.: Smith (G O), 05  
Pleistocene, Mount Desert Island: Blaney, 16  
Pleistocene plants, marine clays: Berry, 17c  
Post-Pliocene: Dawson (J W), 60c  
Shells, fossil and living, in Little Mud Lake:  
Nylander, 09  
Silurian and Devonian: Billings, 69  
Silurian Mollusca, Washington Co.: Williams  
(H S), 12, 13a  
Spirifer, Silurian, Washington Co.: Williams  
(H S), 16a  
Starfish, post-Pliocene, Lewiston: Baker (W  
W), 58  
Walrus, Portland: Anon, 78a

*Petrology*.

- Anorthite and epidote, Phippsburg: Clarke (F  
W), 94  
Aroostook Co.: Gregory (H E), 99, 00  
Auburn, rock formations: Merrill (G P), 84b  
Building stone, microscopic characters: Merrill  
(G P), 82  
Dikes, Johns Bay: Bascom, 99; Portland:  
Lord, 98  
Eleolite syenite, Litchfield: Bayley, 92  
Fox Islands: Smith (G O), 96, 02a  
Granite, North Jay: Wadsworth, 77a  
Igneous rocks, Ogunquit: Keeley, 14  
Litchfieldite: Daly (R A), 18a



## Maine—Continued.

*Petrology—Continued.*

- Monhegan Island: Lord, 00a  
 Mount Desert Island: Frazer, 06  
 Mount Katahdin district: Hamlin (C E), 81  
 Nodules in granite: Merrill (G P), 83a  
 Olivine-bearing diabase, St. George: Dickerman, 84  
 Pegmatites, origin of: Bastin, 10b  
 Pegmatites and associated rocks: Bastin, 11  
 Peridotite, Little Deer Island: Merrill (G P), 88a, 89b  
 Prowersose and other unusual rocks: Bastin, 06  
 Pyrrhotitic peridotite, Knox Co.: Bastin, 08  
 Road materials: Leighton, 08  
 Southern Me.: Ogilvie, 07  
 Spherulites, North Haven: Bayley, 95

*Physical geology.*

- Blazing beach: Penhallow, 05  
 Boulders, grooved, Bethel: True (N T), 62  
 Changes of level: Dana (J D), 75c; Shaler, 74a  
 Distorted pebbles, Rangely Lake: Vose, 68b  
 Earthquake of 1904: Reid (H F), 11c  
 Fulgurite, Waterville: Bayley, 92b  
 Glacial erosion: Stone (G H), 82  
 Glacial pothole, Georgetown: Merrill (G P), 04a  
 Landslide, Portland: Bouvé, 57; Jackson, 57a; Morse, 69  
 Subsidence on coast, recent: Davis (C A), 15, 16a  
 Wind action: Stone (G H), 86

*Physiographic geology.*

- Androscoggin Co., drainage: Burr, 99  
 Androscoggin Glacier: Stone (G H), 80a  
 Aroostook Co.: Bailey (L W), 88a  
 Coast; Johnson (S N), 69; Shaler, 75  
 Diluvium, divisions: Jackson, 47a  
 Drift deposits: Stone (G H), 80  
 Drumlins: Hitchcock (C H), 77b  
 Eastport quadrangle: Bastin, 14  
 Eskers: Stone (G H), 81a  
 Fiords: Remmers, 91  
 General: Holmes (E), 61a; Stone (G H), 81a  
 Glacial and interglacial stages: Clapp (F G) 06a  
 Glacial deposits, classification: Stone (G H) 90  
 Glacial gravels: Stone (G H), 99  
 Glacial period, complexity in northeastern New England: Clapp (F G), 08  
 Glacial potholes: Manning, 01  
 Glacial striae, local deflections: Stone (G H), 85  
 Glaciation: Agassiz, 67a; Clapp (F G), 07d; Packard (A S), 67  
 Mount Desert Island: Blaney, 16  
 Mount Katahdin: Curtis, 15c; De Laski, 72; Tarr, 00  
 Penobscot Bay region: De Laski, 64  
 southern Me.: De Laski, 62  
 Vinal Harbor Island: De Laski, 61  
 Waterville, Quaternary: Little (H P), 17a  
 Gulf of Maine: Lindenkohl, 83  
 Kame rivers: Stone (G H), 83  
 Kames: Stone (G H), 80, 81a  
 Kennebec River basin: Smith (G O), 07a  
 Moraines: Stone (G H), 87; Newington moraine: Katz, 17  
 Mount Desert Island: Davis (W M), 94e

## Maine—Continued.

*Physiographic geology—Continued.*

- Mount Katahdin district: Hamlin (C E), 81; Harvey (L H), 03  
 Osar gravels, coast: Stone (G H), 93  
 Pleistocene shore lines: Katz, 18, 18a  
*Underground water.*  
 Augusta: Smith (G O), 05d  
 General: Bayley, 04a, 05  
 Mineral springs, composition: Clapp (F G), 11b  
 Mineral waters: Goodale, 61  
 Portsmouth-York region: Smith (G O), 05c  
 Southern Me.: Clapp (F G), 09; deep wells: Baylay, 09a  
 Well waters in the slates: Clapp (F G), 11; in the granites: Clapp (F G), 11a  
 Malaspina Glacier, Alaska: Tarr (R S), 07b  
 Malaspina Glacier region, Alaska: Martin (L), 09a  
 Malignite, Poohbah Lake, Ont.: Lawson, 96  
*Mammalia.*  
 Aceratheria: Cope, 79l  
 Aceratherium: Osborn, 93b, 98n, 99d  
 Aceratherium megalodus: Cope, 73p  
 Achaeonodon: Osborn, 83  
 Aelurodon, Nebraska: Barbour, 17c  
 Aelurodon mustelinus: Cope, 73p  
 Aftonian mammalian fauna: Calvin, 09b, 10, 11  
 Age of mastodon and other Proboscidea: Osborn, 12a  
 Agriochoerus: Matthew (W D), 11b; Scott (W B), 94; Wortman, 95  
 Alabamornis: Lucas (F A), 08  
 Alaska: Quackenbush, 09; Equus skull: Hay, 13a  
 Amblypoda: Cope, 84y; dentition: Cope, 88i; evolution: Osborn, 98e; phylogeny: Osborn, 98k  
 American Eocene horses: Granger, 08  
 Amphictis: Riggs, 98  
 Amphicyon: Wortman, 01; dentition: Cook (H J), 15  
 Anaptomorphus, Green River basin: Cope, 73j  
 Anatomy, mylohyoid groove: Osborn, 88b; grooves in jaws: Bensley, 02  
 Ancestry, arboreal: Matthew (W D), 04c  
 Anchisodon, White River beds: Cope, 79h  
 Anchitherium: Leidy, 71i; Truckee beds: Cope, 79o  
 Ancodon: Matthew (W D), 09a  
 Ancodus: Scott (W B), 95; osteology: Scott (W B), 94b  
 Ancylopoda: Osborn, 93d  
 Anoplonassa forcipata: Cope, 69h  
 Antelope deer, Santa Fe marls: Cope, 75r  
 Anthropoids: Gregory (W K), 16a, c  
 Antillean, affinities and origin: Matthew (W D), 18b  
 Aphelops, Loup Forks beds: Cope, 78z  
 Aplodont rodent, Tertiary, Nevada: Furlong, 10  
 Apternodus, skull: Matthew (W D), 10  
 Aquatic life, modifications of limb structure for: Osburn, 06  
 Archaeotherium: Leidy, 50  
 Arctic regions, Eschscholtz Bay: Richardson (J), 54  
 Arctotherium, Pleistocene, Yukon: Lambe, 11



**Mammalia—Continued.**

- Armadillo**, Bridger formation, Wyo.: Osborn, 04; Miocene, Kans.: Cope, 86u; Texas: Gidley, 02
- Artiodactyl**, horned, Nebraska: Lull, 17c
- Artiodactyla**: Cope, 84x, 88q; Marsh, 94g; Peterson, 12
- bunodont**: Sinclair, 14
- classification and phylogeny**: Cope, 88g
- foot structure**: Cope, 84i, 85e
- Loup Fork**: Cope, 78o
- selenodont**, Uinta beds: Scott (W B), 98b, 99
- Uinta Basin**, Utah: Peterson, 18
- White River beds**: Cope, 93d
- Artionyx**: Osborn, 93a, d, g
- Asphalt group of fossil skeletons**: Matthew (W D), 13e
- Basilosaurus**: Carus, 47; Gibbes, 47; Harlan, 34d, 35d, 39, 39a, 41; Koch, (A C) 45, 45a; Lucas (F A), 00b; Müller, 47; Owen (R), 39, 41; Tuomey, 47; Louisiana: Harlan, 34
- Basilosaurus cetoides**, restoration: Gidley, 10
- Bathmodon**: Cope, 72e, 1, 75p, 83, 83f
- Bathyopsis**, Wind River uintathere: Osborn, 13c
- Bats**, Porto Rico: Anthony, 17a
- Bears**, origin: Gidley, 15a
- Pliocene**, Oregon: Merriam, 16b
- Rancho La Brea**, Cal.: Merriam, 11a
- Beaver**, California: Kellogg, 11
- Beluga**, Leda clay, Quebec: Ardley, 16
- Bison**: Allen (J A), 76; Hay (O P), 13b; Lucas (F A), 97, 98b, 99
- California**: Leidy, 67
- Kansas**: McClung, 05; Norton Co.: Hay (R), 85a
- Klondike Creek gravels**: Whiteaves, 03b
- Ohio**: Leidy, 52k
- Syracuse**, N. Y.: Underwood, 90
- Vincennes**, Ind.: Middleton, 00
- Bison and Bos**: Blake (W P), 98d
- Bison antiquus**: Chandler, 16a; osteology: Stewart (A), 97a
- Bison crassicornis** skull: Holland, 15
- Bison latifrons**: Smith (H P), 87
- Kansas**: Mudge, 77b
- Nebraska**: Anon, 88
- skull**: Osborn, 09c
- Bison occidentalis**: Lucas (F A), 99a; restoration of skeleton: McClung, 08a
- Black Hills region**: O'Harra, 10
- Blastomeryx**, osteology: Matthew (W D), 08d
- Boar**, Florida: Leidy, 86a
- Bootherium cavifrons**: Leidy, 54g
- Bos**, Missouri: Dekay, 27a; Quaternary, Arizona: Blake (W P), 98c
- Bovidae**: Leidy, 52; Rhoads, 98
- Brachyostreon**, glyptodont, Mexico: Brown (B), 12c
- Brain**, lowest: Cope, 77s
- size in extinct animals**: Marsh, 85b
- size in Tertiary mammals**: Marsh, 74c
- Brain casts**: Bruce, 83
- Brontops**: Marsh, 89
- Brontotheridae**: Marsh, 74, 76b
- Brontotherium**: Lull, 17d; restoration: Osborn, 14b

**Mammalia—Continued.**

- Bunaelurus**, White River beds, Colo.: Matthew: (W D), 02b
- Bunodont dentition**: Allen (H), 80
- Bunotheria**: Cope, 76d, 83j
- Caenobasileus**, Texas: Cope, 77j
- Calamodon**: Cope, 75zd
- California**: Leidy, 71a, 73f; Yates, 74
- antelope**, Rancho La Brea: Taylor (W P), 11
- Chanac fauna**: Merriam, 16c
- mastodon**: Leidy, 71h
- Mohave Desert**: Merriam, 11b, 15g
- Potter Creek cave fauna**: Sinclair, 04a
- Quaternary caves**: Sinclair, 05a
- Rancho La Brea**: Gilbert (J Z), 10; Merriam, 10a; Carnivora: Merriam (J C), 12a; Mylodon: Stock, 17a
- Sierra Nevada region**: Lindgren, 11a
- Table Mountain**: Leidy, 70t
- tapir**: Blake (W P), 68b
- Tehachapi region**: Buwalda, 16
- Tejon Hills**: Merriam, 15e
- Camel**, Pleistocene, Rancho La Brea, Cal.: Merriam (J C), 13a; Nebraska Miocene Cook (H J), 09; Peterson, 11
- Camelidae**: Matthew (W D), 04e, 18g; Wortman, 98
- Harrison beds**: Loomis, 11
- lower Miocene**: Loomis, 09a
- Oligocene**: Matthew (W D), 04a
- phylogeny**: Cope, 75t, 86p
- Cameloid**, Nebraska: Peterson, 08
- Camelops**: Hay (O P), 13c
- Camelops kansanus**: Leidy, 54e
- Canidae**: Cope, 75q, 79d, 83s; Wortman, 00
- ancestry**: Matthew (W D), 03d
- Loup Fork beds**: Cope, 81e
- Miocene**: Cope, 80r, 81m; Scott, 90c; Colorado: Matthew (W D) 02c
- Oligocene**: Hatcher, 02
- Pliocene and Quaternary**, California: Merriam, 03a
- White River beds**: Scott, 97a, 98a
- Canis**, John Day beds: Condon, 96; subdivision: Merriam, 18b
- Capromeryx**, Rancho La Brea, Cal.: Chandler, 16
- Cariacus**, Indiana: Cope, 78s
- Carnivora**, Eocene, Wyoming: Cope, 73z
- Nebraska Miocene**: Cook (H J), 09c; Peterson, 09a
- origin**: Scott, 88c
- origin of specialized teeth**: Cope, 79f
- teeth**: Cope, 75o
- Tertiary**, John Day region: Merriam, 06b
- Texas**: Cope, 92g
- Carnivora and Rodentia**: Matthew (W D), 12
- Carnivora Fissipedia**: Cope, 82e
- Carson footprints**: Davidson (G), 83
- Caryoderma**: Cope, 86u
- Castoridae**: Matthew (W D), 02d; Taylor (W P), 15
- Castoroides**: Claypole, 90b; Martin (H T), 13
- Greenfield**, Ind.: Moore (J), 00
- Illinois**: Le Conte (J L), 52b; Leidy, 67b
- Indiana**: Moore (J), 90b, 91, 93
- Madison Co.**, N. Y.: Smith (B), 14b
- Ohio**: Newberry, 74r



## Mammalia—Continued.

- Castoroides ohioensis*: Langdon, 83; Moore (J), 90a; Wyman, 46  
 Cat allied to *Felis atrox*: Merriam, 09  
*Catopsalis*: Cope, 82s  
 Cave bear, California: Cope, 79q, 91g  
 Cave mammals: Cope, 69g  
 Cenozoic: Osborn, 10  
 Cenozoic mammal horizons of western North America: Osborn, 09  
*Ceratodus*, Jurassic, Wyoming: Knight (W C), 98  
*Cervalces*, Quaternary, N. J.: Scott (W B), 85, 85a  
*Cervalces* antler from Toronto interglacial: Bensley, 13  
*Cervidae*, phylogeny: Matthew (W D), 08d  
*Cetacea*: Agassiz (L), 52b; Cope, 69h, 90d; Eastman, 07a; Leidy, 68  
*Agarophius pygmaeus*: True (F W), 07  
*Anoplonassa forcipata* Cope: True (F W), 07a  
 classification: True (F W), 08  
 Miocene, Maryland: Cope, 68f  
 New Brunswick, Jacquet River: Gilpin (J B), 74  
 New Jersey: Leidy, 53e  
 North America: Perkins (G H), 08, 10  
 South Carolina: Leidy, 53e  
 synopsis: Cope, 67c  
 toothed, phylogeny: Lucas (F A), 01g  
 types in Museum of Comparative Zoology: Eastman, 07a  
 United States: True (F W), 08a  
 Vermont: Hitchcock (E jr), 59; Thompson (Z), 50a  
*Cetacea*, Pinnipedia, Sirenia, Zeuglodontia: True (F W), 12b  
*Chalicotherium*: Osborn, 91b, 93d; ancestry: Osborn, 92b  
*Chalicotheroidea*, osteology: Holland, 13  
 Chemical investigation: Greene (F V), 53  
*Chirox*, Puerco beds: Cope, 87h  
*Chlamytherium septentrionalis*, Florida: Sellards, 15c  
*Choristodera*: Cope, 84v  
*Chriacidae*, relations to primates: Earle, 98  
*Chrysochloridae*: Matthew (W D), 06b  
*Claenodon*: Matthew (W D), 98  
 Classification of Mesozoic: Osborn, 87a  
 Colorado, Huerfano Basin: Osborn, 97  
     *Megacerops*: Leidy, 70a  
     northeastern: Matthew (W D), 01  
     San Juan Basin: Granger, 17  
 Comparison of American and European faunas: Cope, 79; Scott, (W B) 89  
 Conard fissure, a Pleistocene bone deposit in Arkansas: Brown (B), 08  
*Condylarthra*: Cope, 82 f, 84u; Pavlow, 87  
 Connecticut: Schuchert, 14c  
     Berlin: Silliman, 34  
     Farmington, mastodon: Lull, 14c  
 Correlation of Cenozoic: Osborn, 10, 10a  
*Coryphodon*: Earle, 92a, b; Marsh, 76c; Osborn, 98l; Owen (R), 78  
     brain: Cope, 77k; Marsh, 77g, 78f  
     restoration: Marsh, 93c  
     structure: Cope, 78v

## Mammalia—Continued.

- Coryphodon radians*: Osborn, 98c  
*Coryphodontidae*: Marsh, 77; Cope, 93e; Wasatch beds: Cope, 82i  
 Cranium: Wyman, 53  
*Creodonta*: Cope, 84o, 81h, y, 86r, 87m; Matthew (W D), 01a; Osborn, 00b; Scott (W B), 88a, 92a, b, 95g; Wortmann, 00, 00a  
*Creosaurus*: Osborn, 03c  
 Cretaceous: Cope, 89e; Marsh, 89c, 91g, 92a; Matthew (W D), 16; Osborn, 91, 93c  
*Ctenacodon*: Marsh, 79h  
 Cuba: Allen (G M), 17, 18; Egozcue y Cia, 72; Fernández de Castro (M), 64; Matthew (W D), 14c; Spencer (J W), 10d, e; Vaughan, 02g  
     Cienfuegos: Leidy, 68c  
     Isle of Pines: Peterson, 17  
     Pleistocene: Torre, 12a  
 Cumberland Pleistocene fauna: Gidley, 14  
*Cynarctus*, Nebraska: Barbour, 14e  
 Dakota: Leidy, 69  
 Dawn of Mammalia: Underhill (B M), 10  
 Deep River beds, Mont.: Scott (W B), 93c, 95b  
 Deer, distribution: Matthew (W D), 17d  
 Delphinoid cetacean, Miocene, Maryland: True (F W), 11, 12  
*Delphinus*, Virginia: Leidy, 52f  
 Dental evolution: Cope, 93j  
 Descriptions: Leidy, 51d, 56a  
*Desmatotherium*: Scott (W B), 83a  
*Desmostylus*: Hay (O P), 15a; McCornack, 14; Merriam, 06, 11d  
 Development and geologic relations: Case, 98  
*Diacodexis*, Wasatch: Cope, 82zi  
*Diceratherium*, Nebraska: Cook (H J), 12a; Peterson, 06b, 12b; White River beds, S. Dak.: Hatcher, 94b, 97  
*Diceratherium cooki*, mounted skeleton: Peterson, 11b  
*Dicotyles*: Leidy, 56h  
     Illinois: Le Conte (J L), 52  
     Indiana: Leidy, 60b  
     Missouri: Le Conte (J L), 52a  
     New Jersey: Marsh, 70d  
     Ohio: Klippart, 75; Newberry, 74p  
*Dicotylinae*: Leidy, 53b, 57h; John Day beds: Cope, 88h  
*Dilophodon*: Scott (W B), 83a  
*Dinartotherium*, Nebraska, Pleistocene: Barbour, 16b  
*Dinictis*: Lucas (F A), 98a; Scott (W B), 89b; Wyoming: Riggs, 96; White River beds: Adams (G I), 95  
*Dinictis felina*: Leidy, 54c  
*Dinobastis*, Oklahoma: Cope, 93h  
*Dinoceras*: Marsh, 72m  
*Dinoceras* and *Brontotherium*, nomenclature: Cope, 79s  
*Dinoceras mirabile*, restoration: Emerton, 87; Marsh, 81f  
*Dinocerata*: Cope, 73o, 85r, s, 86j; Marsh, 73a, d, f, m, 76, 85, 86; Owen (R), 76; Osborn, 81, 00e; Scott (W B), 86; Wyoming: Gaudry, 85  
*Dinochoerus*, Loup Fork beds, Nebraska: Peterson, 05b, c



## Mammalia—Continued.

- Dinocyon, Miocene, Texas: Matthew (W D), 02a  
 Dinohyus: Peterson, 05c  
 Dinotherium, Evansville, Ind.: Casselberry, 45  
 Diplacodon, Utah: Hatcher, 95  
 Diplarthra, metapodial keels: Wortman, 93b  
 Diploceras, Uinta Eocene: Peterson, 14  
 Dioplotherium (Sirenia): Cope, 83g, t  
 Distribution of Pleistocene Mammalia: Hay (O P), 09d  
 Dog, Loup Fork beds, Nebr.: Cope, 90g  
 Dog (Pachycyon), Ely Cave, Lee Co., Va.: Allen (J A), 85  
 Dolichocephaly and brachycephaly: Osborn, 02  
 Dolichorhinus, Uinta beds: Peterson, 14c  
 Dolphin, California: Lull, 14  
 Dorudon: Agassiz (L), 48; Gibbes, 48a; South Carolina: Gibbes, 45  
 Dorudon serratus: True (F W), 08b  
 Dromatherium: Leidy, 70c; Triassic, North Carolina: Osborn, 87, 87b  
 Dromomeryx: Douglass, 09b  
 Dryolestes: Marsh, 78c, 79f  
 Edentata: Cope, 89i; Harlan, 43a; Marsh, 74b; Stock, 18b; Wortman, 96a  
   ancestry: Matthews (W D), 12c  
   Eocene: Matthew (W D), 18a  
   Miocene (correction): Williston, 98f  
   origin: Wortman, 96b  
   teeth, structure: Harlan, 34c  
 Edentate-like remains, Mascall beds, Oregon: Sinclair, 06  
 Eland, Maryland: Gidley, 13a  
 Elaphus, Ontario Co., N. Y.: Hall, 87c  
 Elephant: Barton, 14; Hall, 67g; Leidy, 75b; Matthew (W D), 16d; Pohlig, 87  
   California: Hovey, 74; Yates, 74  
   Colorado, Fort Lyon: Woodhull, 72; Golden: Rockwell, 72  
   distribution: Foster, 57  
   evolution: Lull, 08, 14a  
   molars: Winchell (A), 63b  
   Pleistocene: Lucas (F A), 06  
   restorations: Osborn, 14c  
   Vermont: Agassiz (L), 50d  
   Zanesville, Ohio: Jeffries, 57a  
 Elephant myths: Scott (W B), 87a  
 Elephant teeth: Harlan, 23; Leidy, 74; Alaska and California: Blake (W P), 67g  
 Elephas: Barton, 06, 07; Blake (C C), 63a; Falconer, 63; Gibbes, 50d; Kunz, 16; Lucas (F A), 02b  
   Alaska: Pinart, 75  
   geologic position: Newberry, 70h  
   Grinnell, Iowa: Barbour (E H), 90b  
   Hamilton, Ont.: Billings, 63d  
   Mexico: Edwards, 65, 67; Weber, 67  
   Minnesota: Holzinger, 85  
   New York: Anon, 37; Cortlandt Co.: Woolworth, 47; Wyoming Co.: Clarke (J M), 87a  
   Ontario: Cottle, 52  
   Texas: Blake (C C), 62  
   Washington, southwestern: Donald, 79; Whitman Co.: Sternberg, 03  
   Wyoming: Knight (W C), 03d

## Mammalia—Continued.

- Elephas hayi, Nebraska: Barbour, 15f, j  
 Elephas primigenius, Alaska; Gaudry, 72, 73; Spokane, Wash.: Higley, 86  
 Elk or moose, Quaternary: Scott (W B) 85b  
 Elotherium: Scott (W B), 96a  
   California: Leidy, 68a  
   Nebraska: Barbour, 12a  
   osteology: Scott (W B), 98  
   restoration: Marsh, 94a  
 Entelodontidae, revision: Peterson, 09  
 Eobasileus: Cope, 73zd, zl, zm, 74n  
 Eocene: Cope, 82v; Marsh, 73m; Matthew (W D), 14b; Wortman, 01a  
   lower: Matthew (W D), 15f  
   Missouri River region, list: Leidy, 54d  
   primates: Osborn, 01f  
   Wyoming: Granger, 10  
 Eodelphis, Red Deer River: Matthew (W D), 16  
 Eohippus, Wyoming: Granger, 11  
 Eomoropus: Osborn, 13a  
 Eotitanops, restoration: Osborn, 14b  
 Eotitanotherium: Peterson, 14c  
 Epiaphelops, Nebraska: Cook (H J), 12  
 Equidae: Blake (C C), 63; Cope, 92j; Gidley, 07a; Hay (O P), 13; Leidy, 47, 65d, 68d, 83; Marsh, 74a, d; Wallace (J P), 00; Wortmann, 83b, 84  
   craniometry: Osborn, 12e  
   dentition: Cope, 92f  
   Eocene: Granger, 08; Matthew (W D), 12a  
   evolution: Beasley, 03; Lull, 07a; Matthew (W D), 03, 13g, 15b; Osborn, 04i, q, 05a, o; Scott (W B), 86a; Underhill (B M), 07  
   extinction: Garman, 83  
   Mexico: Owen (R), 69, 70; Vera Cruz: Cope, 86a  
   Miocene: Cope, 86c; Gidley, 04; Loomis, 08b  
   Miocene and Pliocene, California: Merriam, 15d  
   Mohave Desert, Cal.: Merriam (J C), 13f  
   Nebraska: Leidy, 58c  
   North Dakota and Montana: Douglass, 08b  
   Oligocene: Osborn, 04a; Assiniboia: Lambe, 06e  
   origin: Cockerell, 04; Wortman, 82a, 83  
   Pleistocene, Texas: Gidley, 00  
   Pliocene, Texas: Cope, 85x  
   polydactyl: Marsh, 79d, 92b  
   revision: Gidley, 07a; Osborn, 18  
   three-toed, dentition: Cope, 92f; Miocene, South Dakota: Gidley, 03  
   Yale collection: Lull, 13  
 Equus: Cope, 84a; Gibbes, 50c; Gidley, 01  
   ancestry: Matthew (W D), 16g  
   evolution: Osborn, 05f  
   Mascall beds, Oregon: Gidley, 06a  
   Nebraska: Marsh, 68a  
   Pleistocene, Yukon: Hay (O P), 17a  
   relations to Pliohippus: Merriam, 16a  
 Equus excelsus, cranial characters: Cope, 91i  
 Equus fraternus, Costa Rica: Alfaro, 11a  
 Equus major, Troy, N. Y.: Skilton, 58  
 Equus scotti, Rock Creek, Tex.: Troxell, 17a  
 Equus skull, Equus bed, Texas: Cope, 91f  
 Erethizon, Arizona: Allen (J A), 04



## Mammalia—Continued.

- Esthonyx: Cope, 85h  
 Euceratherium, California: Sinclair, 04  
 Eucrotaphus: Leidy, 50  
 Eusmilus, Nebraska: Barbour, 15; Oligocene, South Dakota: Hatcher, 95a  
 Evolution: Cope, 83zg, 84zc; Matthew (W D), 15b; Scott (W B), 91, 91c, 92; primates: Gregory (W K), 16a  
 Evolution and migrations of Tertiary mammals: Depéret, 08  
 Extinction of Mammalia, cause: Osborn, 06b  
 Faunal lists of Tertiary Mammalia of the West: Matthew (W D), 09b  
 Feet: Cope, 81n  
 Felidae: Adams (G I), 96b, 97; Barbour, 15; Cope, 79d, 80p  
   phylogeny: Matthew (W D), 10b  
   Quaternary, California: Bovard, 07  
   Rancho La Brea: Merriam, 17c, 18c  
 Felis: Dugès, 94  
 Felis atrox, Mississippi: Leidy, 53a  
 Florida: Leidy, 84b, 87, 89b, 90, 90a; Sellards, 16a  
   Alachua clays: Leidy, 96  
   Marion Co.: Leidy, 89d  
   southern: Sellards, 15  
 Foramina perforating squamosal bone: Cope, 80a  
 Ganodonta, primitive edentates: Osborn, 97c; Wortman, 97  
 General: Cope, 79r, 87, 87l, 88n, 90b, 92j; Flower, 76; Harlan, 34; Leidy, 53c, 54b, 57c, 72f; Matthew (W D), 05a, 15; Osborn, 93f, 94a, 98p, 05i; Owen (R), 43, 47a; Schmidt, 86; Scott (W B), 13  
 Genetic relations: Gregory (W K), 10  
 Georgia, Brunswick Canal: Couper, 42  
   Darien: Owen (R), 46  
   southern: Couper (J H), 43  
 Glires, Eocene: Matthew (W D), 18a  
 Glyptodon, Texas: Cope, 88l; Zumpango, Mex.: Cuatáparo, 75  
 Glyptotherium, Pleistocene, Texas: Osborn, 03b  
 Goat-antelope from cave fauna of Pikes Peak region: Cragin, 00  
 Ground sloths: Matthew (W D), 11a  
   Colorado: Cockerell, 09  
   Quaternary, California: Merriam, 00  
 Hapalops: Matthew (W D), 12c  
 Haploconus, Puerco beds, N. Mex.: Cope, 82t  
 Harlanus: Leidy, 54b; Owen (R), 47a  
 Hemiganus, Puerco beds: Cope, 82za, 85o  
 Heptacodon, S. Dak.: Marsh, 94b  
 Heptodon, Wasatch: Cope, 82zf  
 Heterotitanops, Uinta beds: Peterson, 14a  
 Hipparion group, Pacific region: Merriam, 15c  
 Hipparion-like horses: Merriam, 16f  
 Hippidium, Loup Fork beds, Oregon: Cope, 80f  
 Hippopotamus: Moore (J), 90  
 Hippotherium: Cope, 89; Leidy, 85  
 Homoplasy: Osborn, 02d  
 Honduras: Nason, 87  
 Hoplophoneus: Adams (G I), 96  
 Hoplophoneus occidentalis, White River beds: Riggs, 96a

## Mammalia—Continued.

- Horns, phylogeny and ontogeny: Osborn, 12h  
 Hyaenodon: Scott (W B), 95a; restoration: Scott (W B), 95f  
 Hydrarchos: Lister, 46; Müller, 47c; Rogers (H D), 45  
 Hydrarchos harlani: Koch (A C), 45a  
 Hydrargos sillimanii: Koch (A C), 45; Wyman, 45  
 Hydrochoerus, South Carolina: Leidy, 56i  
 Hyopotamus, South Dakota: Scott, 94a  
 Hyopsodidae: Loomis, 05  
 Hyopsodus: Matthew (W D), 15g  
 Hypertragulidae: Matthew (W D), 02e  
 Hypisodus: Matthew (W D), 02e  
 Hypohippus, Nebraska: Barbour, 14  
 Hypotemnodon, Oregon: Eyermann, 94, 96  
 Hyrachyas, osteology: Cope, 73za  
 Hyracodon: Lambe, 06d; Scott (W B), 96, 97b  
 Hyracotherium: Earle, 96; Wortman, 96  
 Idaho formation: Merriam, 18a  
 Illinois: Le Conte (J L), 48a  
   Galena: Leidy, 62  
   Illioplis: Anon, 70  
   Jo Daviess Co.: Leidy, 70e  
 Index of genera and families: Palmer (T S), 04  
 Indiana, Bartholomew Co.: Edwards (J J), 02  
   Evansville, Quaternary: Leidy, 54f  
   Monroe Co.: Wylie, 59  
   Pleistocene: Hay (O P), 12  
   post-Pliocene: Thompson (M), 86a  
 Insectivora: Gregory (W K), 12  
   Eocene: Cope, 85n; Matthew (W D), 05e, 18a  
   genetic relations: Gregory (W K), 10b  
   South Dakota: Leidy, 68i  
 Iowa, Aftonian: Thomas (A O), 12a  
   caribou: Leidy, 79  
   Pleistocene: Hay (O P), 14  
 Isolobodon; Porto Rico: Allen (J A), 16  
 John Day fauna, rodents and ungulates: Sinclair, 05  
 Jurassic: Marsh, 79h, 87; Rocky Mountains: Marsh, 80e, 81e  
 Kansas, Burlington: Leidy, 70i  
 Kentucky, Big Bone lick: Cooper, 31; Rafinesque, 32a; Shaler, 69a; Wistar, 18  
 Kurtodon (for Athrodon): Osborn, 87c  
 Lagomorph genera, systematic position: Dice, 17  
 Lagomorpha: Gidley, 12a  
 Lambdotherium: Osborn, 97a  
 Laramie: Cope, 82z  
 Leidyotherium, Abingdon, Va.: Prout, 60a  
 Lemuridae: Cope, 75q, 82j  
 Lemuroidea: Earle, 97  
   classification and phylogeny: Gregory (W K), 15b  
   Eocene: Cope, 85n  
   Puerco formation: Cope, 84n  
 Leporidae: Matthew (W D), 02d  
 Leptarctus: Wortman, 94a  
 Leptauchenia decora, restored skeleton: Sinclair, 10a  
 Leptomeryx: Scott (W B), 91c  
 Limnofelis, Wyoming: Marsh, 72p  
 Limnohyops: Earle, 92  
 Llama, Tequixquiac, Mex.: Bárcena, 82a



## Mammalia—Continued.

- Llama remains, Colorado and Kansas: Cragin, 92  
 Lophiodon, New Jersey: Marsh, 71h  
 Lophiotherium, Green River, Wyo.: Leidy, 70u  
 Lophiodon: Osborn, 92f  
 Lophiodontidae: Scott (W B), 83a  
 Louisiana, New Iberia: Leidy, 84, 84c; Petite Anse: Cope, 95f; Leidy, 89f  
 Loup Fork fauna: Scott (W B), 90a  
 Loxolophodon: Cope, 73t, zn; Hill (F C), 81; Osborn, 79, 81  
 Eocene, southern Wyoming: Cope, 73g  
 lower jaw: Cope, 79m  
 Machaerodus, Kern Co., Cal.: Merriam, 05a;  
 Loup Fork beds: Cope, 87p; Cragin, 92a  
 Machairodus occidentalis: Leidy, 66b  
 Mammal horizons of North America: Osborn, 07  
 Mammal-bearing beds in northwestern Nevada: Merriam, 07a  
 Mammalia, reclassification: Osborn, 07e  
 Mammalian molar teeth: Osborn, 07h  
 Mammalian paleontology, ten years' progress: Osborn, 05e  
**Mammoth**: Ashe, 06; Lucas (F A), 00e; Mac Lean, 78; Matthew (W D), 15d; Packard (A S), 68; Peale, 02, 03; Turner (G), 99; Wyman, 54  
 Alaska: Maddren, 05a  
 Arizona: Blake (W P), 00a  
 California: Blake (W P), 55b  
 Canada: Billings, 56m; Lambe, 98; Hudson Bay region: Bell (R), 98b  
 date of extinction: Lloyd, 04  
 distribution, etc.: Owen (R), 47; Illinois and Iowa: Anderson (N C), 05  
 Franklin Co., Kans.: Charlton, 90  
 Iowa: Parker (H W), 84  
 Michigan: Lane, 02  
 mounted: Osborn, 07a  
 Nebraska: Barbour, 13, 15f; Sioux Co.: Cook (H J), 14  
 New Jersey, Schooley's Mountain: Stewart (T P), 28  
 occurrence: Worthen, 71b; in New York: Clarke (J M), 18  
 Ohio: McClure, 04  
 Ohio Valley: Hunter, 69  
 Ontario: Pantou, 91  
 osteology: Richardson (J), 54a  
 size: Lucas (F A), 08a  
 stratigraphic position: Rogers (H D), 54c  
 Tioga Co., Pa.: Edwards (T), 93  
 Washington Co., Iowa: Gass, 82  
 Wythe Co., Va.: Madison (B), 06  
 Yukon and Alaska: Dawson (G M), 94a  
**Mammoth** expeditions to Alaska: Quackenbush, 09  
**Man**, relation to Tertiary Mammalia: Cope, 75z  
 Marsupialia: Gregory (W K), 12  
 Miocene, Colorado: Scott (W B), 84  
 origin: Gidley, 15  
 Puerco beds: Cope, 85p  
 Tertiary: Cope, 84t  
 Maryland, Delphinus: Harlan, 42b; Miocene: Cope, 67b, 68h

## Mammalia—Continued.

- Massachusetts, Marthas Vineyard, fossil horse: Woodworth, 00a  
 Mastodon: Broadhead, 81; Cope, 84r; Cuvier, 06, 06a; Gibbes, 50e; Grant (E), 42; Hall, 67g; Hays, 34, 41, 42, 43, 43a; Koch (A C), 45b; Leidy, 70m; Lyell, 43b; MacLean, 78; Matthew (W D), 15d; Smith (J A), 46; Warren (J C), 46, 47; Wright (F B), 03  
 age, means of estimating: Osborn, 12a  
 analyses of bones: Jackson, 46  
 California: Blake (W P), 55b; Silliman (jr), 68; Yates, 74; Stanislaus Co.: Leidy, 70m  
 Canada: Billings, 56m; Hudson Bay region: Bell (R), 98b  
 caries in: Leidy, 86b  
 Colorado: Emrich, 09  
 contents of stomach: Hunt, 74  
 cranium: Wyman, 57  
 date of extinction: Lloyd, 04  
 dental system: Horner, 43a  
 geologic position: Foster, 49d; Newberry, 70h  
 Illinois: Warren (J C), 54a; Wilber, 61; distribution in: Anderson (N C), 05; Bagg, 09  
 Indiana, Randolph Co.: Moore (J), 97a  
 Iowa, distribution in: Anderson (N C), 05  
 Kansas, Douglas Co.: Savage, 78  
 Equus beds: Deere, 08  
 Franklin Co.: Wheeler (W), 78  
 Gomphotherium: Hay (O P), 17  
 Loup Fork Miocene: Sternberg, 07a  
 Massachusetts, Colerain: Hitchcock (E), 72  
 Worcester Co.: Rice (F P), 85  
 Mexico: Roemer, 87; northern: Eaton (G F), 05  
 Michigan: Lane, 02  
 Missouri: Horner, 40, 40a; Desor, 50c; Hoy, 71; Koch (A C), 43, 57a  
 Benton Co.: Whipple, 44  
 Jackson Co.: Ballard, 80  
 Kansas City: West, 77  
 Kimmswick: Lucas (F A), 00f  
 Nebraska, Brown Co.: Barbour, 14a  
 Cherry Co.: Barbour, 14d  
 Niobrara River: Leidy, 58b  
 New Jersey, Freehold: Lockwood, 83  
 Hackettstown: Maxwell, 45  
 Long Branch: Van Rensselaer, 26  
 Monmouth Co.: Dekay, 24  
 Plattsburg: Hallowell, 46  
 Schooley's Mountain: Jackson (J B S), 45  
 New Mexico: Cope, 75j; Leidy, 72g  
 New York: Brevoort, 59; Cheney, 72; Clarke (J M), 03b, k, 08; Hartt, 71; Prime, 45; Van Rensselaer, 28  
 Chester: Hovey, 08c  
 Cohoes: Hall, 71; Marsh, 67; Safely, 66  
 distribution: Clarke (J M), 03k, 18  
 Genesee Valley: Dewey, 37a  
 Hudson River: Annan, 93  
 Ithaca: Sheldon (P), 15; Wilder, 71  
 New York Island: Whitfield, 91b  
 Ontario Co.: Van Rensselaer, 27  
 Orange Co.: Gordon (R), 02; Lucas (F A), 02d; Miller (S), 36; Shurtleff, 46  
 Rochester: Guernsey, 31  
 Staten Island: Hollick, 01a  
 Wyoming Co.: Clarke (J M), 88



**Mammalia—Continued.**

- Mastodon:** Nova Scotia: Piers, 12a  
 occurrence: Worthen, 71b  
 Ohio: Atwater, 20; Claypole, 95a; Foster, 39;  
 Hildreth, 36b; Horner, 43; Klippart, 75a  
 Auglaize Co.: Gilbert, 71c  
 Cincinnati: Hayes (S), 95  
 Granville: Hicks, 73  
 Ontario: Panton, 91  
 osteology: Richardson (J), 54a  
 os hyoides: Godman, 24  
 recent extinction: Cope, 82k  
 restoration: Marsh, 92h; Osborn, 14c  
 Santa Fe marls: Cope, 75zb  
 South Carolina: Loomis, 17, 18  
 South Dakota: Osborn, 18c  
 Tennessee: Carpenter (W M), 46; Troost, 34;  
 Anon, 13; Knoxville: McCallie, 92  
 Tetrabelodon lulli, Nebraska: Barbour, 15h  
 Texas, Medina Co.: Mackensen, 05  
 Yukon Valley: Osgood, 05
- Mastodon and llama, Florida:** Leidy, 86  
**Mastodon and mammoth:** Winchell (A), 78a  
**Mastodon americanus**, hyoid bone: Holland,  
 05a  
**Mastodon angustidens:** Warren (J C), 50, 52a  
**Mastodon giganteus:** Warren (J C), 52  
 geologic position: Warren (J C), 49  
 teeth: Lapham, 55; Warren (J C), 55a  
**Mastodon obscurus:** Whitfield, 88  
**Mastodon oligobunis:** Cope, 93g  
**Megacerops**, restoration: Lull, 05a; South Da-  
 kota: Lull, 05  
**Megalocnus**, Cuba: Matthew (W D), 18d; Torre,  
 15  
**Megalonyx:** Leidy, 55, 57i; Harlan, 31c; Hovey  
 (H C), 91b, 00; Safford, 91  
 Big Bone cave, Tenn.: Mercer, 97  
 California, Pleistocene: Stock 13  
 Georgia: Cooper (W), 27  
 Kentucky: Harlan, 31  
 McPherson Co., Kans.: Lindahl, 92  
 Ohio: Claypole, 91a  
 Tennessee: Safford, 92; Troost, 34; White Co.:  
 Harlan, 35c  
 Virginia: Cooper (W), 36; Cuvier, 04; Jeffer-  
 son, 99; Wistar, 99  
**Megalonyx jeffersoni**, Ohio: Orton, 91a  
**Megatherium:** Agassiz (L), 62, 63a; Owen (R),  
 51  
 Florida: Matthew (W D), 17f  
 Georgia: Cooper (W), 24; Hodgson, 46; Mit-  
 chill, 23  
 Mexico: Dugès, 97  
**Megatherium americanum:** Owen (R), 60  
**Meniscoessus:** Cope, 82z  
**Meniscotherium:** Osborn, 91b, 92e  
**Menodus:** Cary, 92  
**Merycochoerus:** Douglass, 07  
 John Day beds, Oreg.: Bettany, 76  
 Montana: Douglass, 00  
**Merycodus**, Miocene, Colorado: Matthew (W  
 D), 04; Mohave, Cal.: Merriam (J C), 13b  
**Merycoidodon:** Gilmore, 06b; Leidy, 48  
**Merycoidodonts:** Douglass, 06, 07-07b  
**Merycopater:** Cope, 79g  
**Mesodactyla**, Eocene: Marsh, 92c

**Mammalia—Continued.**

- Meshippus:** Scott (W B), 91c; tooth structure:  
 Lambe, 05c  
**Mesonyx:** Cope, 82q  
**Mesozoic:** Marsh, 91f; Osborn, 91a  
 classification: Osborn, 88, 88a  
**Metalophodon**, dentition: Cope, 73w; Eocene:  
 Cope, 72t  
**Meteoreodon**, Nebraska: Barbour, 17b  
**Mexico:** Cope, 84h; Osborn, 05j; Villada, 03, 10  
 Carnivora, Pliocene and post-Pliocene: Freu-  
 denberg, 10  
 Chihuahua: Diffenderfer, 73  
 Oaxaca, Glyptodon: Felix, 93  
 Quaternary: Castillo, 69a  
 Michigan, Lenawee Co.: Winchell (A), 64a  
**Microconodon**, Triassic, North Carolina: Os-  
 born, 86, 87, 87b  
**Mink** from shell-heaps of Maine: Loomis, 11a  
 Minnesota, Pleistocene: Winchell (N H), 10  
**Miocene:** Marsh, 93d  
 marine, Atlantic Coastal Plain: Cope, 96b  
 new locality: Cockerell, 08p  
 South Dakota: Matthew (W D), 06c, 07  
**Mioclaenus**, Eocene: Cope, 82g  
 Mississippi, Claiborne Co.: Leidy, 59d; Natchez:  
 Dickeson, 46  
 Mississippi Valley, Upper: Allen (J A), 76a  
 Missouri: Koch, 39  
 Benton Co.: Chaloner, 43  
 New Madrid: Bringier, 21  
 southwestern: Lewis (J L), 80  
**Missourium kochii:** Goddard, 41  
**Mixedectidae:** Osborn, 01f, 02b  
**Molar cusps**, nomenclature: Osborn, 88c, 92d  
**Molar evolution:** Osborn, 88d, 07h  
**Molar patterns**, primates: Gregory (W K), 16  
**Molar teeth:** Cope, 74e  
 trituberculate teeth: Cope, 84e  
 types: Cope, 74f  
 Montana: Cope, 78i; Douglass, 05  
 Neocene lake beds: Douglass, 99  
 south central: Douglass, 02a  
**Titanotherium** beds: Matthew (W D), 03b  
 White River beds: Douglass, 02  
**Moropus:** Matthew (W D), 18c; Osborn, 18b  
 skull: Barbour (E H), 08  
 skeletal parts: Barbour (E H), 09  
**Morrison fauna:** Mook, 16  
**Multituberculata:** Broom, 14a; affinities: Grang-  
 er, 15  
**Musk-ox** skull, Utah: Chadbourne, 71  
**Mustelid**, Taxidea, Thousand Creek Pliocene:  
 Butterworth, 16  
**Mustelidae**, Loup Fork beds: Cope, 90f  
**Mylagaulidae:** Matthew (W D), 02d; Riggs, 99  
**Mylagaulodon**, John Day beds: Sinclair, 03a  
**Mylodon:** Allen (G M), 13; Harlan, 42; Leidy,  
 55, 85a  
 Central America: Leidy, 70c  
 Nebraska: Allen (G M), 13  
 Rancho La Brea, Cal.: Stock, 14, 14a, 17a, b  
 Texas: Lull, 15b  
**Myomorphus**, Cuba: Fernández, 71; Pomel, 68  
**Myrmecoboides**, marsupial, Fort Union beds,  
 Mont.: Gidley, 15  
**Myxodectidae:** Osborn, 01f



## Mammalia—Continued.

- Nebraska: Leidy, 50b, 52a, b, 53, 53f, 69  
 Brown Co.: Barbour, 14a  
 Geomys from loess: Leidy, 67a  
 Loup Fork beds: Hatcher, 94  
 Miocene: Peterson, 10  
 Niobrara valley: Leidy, 58c, e  
 Pliocene: Leidy, 58a  
 rhinoceros, Miocene: Cook (H J), 12, 12a, c  
 Sioux Co., bone beds: Barbour (E H), 09b;  
 catalog: Cook (H J), 12b  
 ungulates: Leidy, 51a  
 western, Pleistocene: Matthew (W D), 18  
 Nesophontidae: Anthony, 16  
 Nevada, Astor Pass, Pleistocene: Merriam, 15f  
 northeastern: Merriam, 14  
 Truckee beds, proboscidean tooth: Buwalda,  
 14a  
 Virgin Valley: Gidley, 08a; and Thousand  
 Creek: Merriam, 11c  
 New Brunswick, cetacean: Honeyman, 74b  
 New forms: Marsh, 87a  
 New Jersey: Cope, 68a; greensand: Leidy, 51e  
 New Mexico, Eocene: Cope, 81l, s, 82, 82a;  
 Puerco beds: Cope, 82zc, 83zf, 85m  
 San Juan Basin: Granger, 17  
 Santa Fe marls: Cope, 74m  
 New York, Onondaga Lake: Smith (B), 14  
 postglacial: Clarke (J M), 10  
 Nicaragua: Leidy, 86c  
 Nimravidae: Cope, 80r; and Canidae: Cope, 81b  
 North America: Leidy, 69  
 North Carolina: Leidy, 71c; Mesoteras: Cope,  
 70m  
 Notharctus, Eocene lemuroid: Granger, 17;  
 Gregory (W K), 14, 15b, d  
 Nothodectes, dentition: Matthew (W D), 17c  
 Nothotherium, Rancho La Brea, Cal.: Stock,  
 13, 17, 17d  
 Occipital condyles, modifications: Mead (C S),  
 06  
 Octodont, Porto Rico: Allen (J A), 16  
 Ohio: Hildreth, 36b; Muskingum Co.: Foster, 38  
 Ontario: C, 55  
 Ottawa Valley, seal: Dawson (J W), 77e  
 western: Ami, 98a  
 Oregon: Cope, 78i; Perkins (H C), 42a  
 Ironside: Merriam, 16d  
 John Day region: Leidy, 70p; Sternberg, 81  
 Miocene: Cope, 79c, 80  
 Miohippus beds: Marsh, 94e, f  
 Pliocene: Cope, 89d  
 Pleistocene: McCornack, 14  
 Ticholeptus beds fauna: Cope, 86c  
 Oreodon, Miocene, Nebraska: Bettany, 73;  
 osteology: Scott (W B), 85c  
 Oreodon culbertsonii, restoration: Stewart  
 (A), 97  
 Oreodontidae: Cope, 84f, p; Scott (W B), 89a,  
 90b  
 Origin: Baur, 97; Broom, 14c; Cope, 84z; Marsh,  
 98d, 99c; Osborn, 98g, j, q, 99b, 00g  
 Orindan fauna, California: Merriam (J C), 13d  
 Orycterotherium, Missouri: Harlan, 42, 43  
 Orthocynodon, Bridger beds, Wyo.: Scott  
 (W B), 82, 83

## Mammalia—Continued.

- Ovibos, Harrison Co., Iowa: Leidy, 70k  
 loess, Iowa: McGee, 87  
 Pleistocene gravels near Midway, B. C.  
 Lambe, 07a  
 Ovibos cavifrons, West Virginia: Hatcher, 02c  
 Ox, extinct: Leidy, 54g; Arkansas River  
 Leidy, 52i  
 Oxen, fossil, Big Bone Lick: Faujas de Saint  
 Fond, 03  
 Oxyaena: Cope, 82q; Matthew (W D), 98; Os-  
 born, 00b; restoration: Wortman, 00a  
 Oxydactylus, Loup Fork beds, Nebr.: Peter-  
 son, 04  
 Pachyderms: Leidy, 68j  
 Palaeonictis, Wasatch beds: Osborn, 92c, g  
 Palaeosyops: Cary, 92; Earle, 91, 91a, 92, 95  
 Leidy, 71g; Matthew (W D), 97b; Wyom-  
 ing: Leidy, 70q, 71e  
 Palauchenia, Mexico Valley: Owen (R), 70a  
 Palaeotherium: Prout, 46, 47  
 Pantodonta: Osborn, 98e  
 Pantolambda, Puerco beds, N. Mex.: Cope, 82t,  
 83u  
 Pantolestes: Matthew (W D), 05e  
 Paramylodon, Rancho La Brea, Cal.: Sinclair,  
 10  
 Parietis, John Day beds: Scott (W B), 93b  
 Patriofelis: Leidy, 70d; Osborn, 00b; Wortman,  
 94  
 Peccary: Leidy, 57h, 83a; new genus: Loomis,  
 10a  
 Pennsylvania: Leidy, 89  
 Bison: Rhoads, 95  
 bone caves: Leidy, 80  
 Erie Co.: Van Rensselaer, 28  
 Hartman's Cave, Stroudsburg: Mercer, 94  
 Port Kennedy bone cave: Cope, 96c  
 Rhinoceroides: Featherstonhaugh, 31  
 Peraceras: Cope, 80l  
 Periptychidae: Cope, 82zb, 97b  
 Perissodactyla: Cope, 81i, w, 87n; Gidley, 12  
 absence of pollex: Matthew (W D), 17b  
 Bridger Eocene: Cope, 73m  
 Condylarthra: Cope, 82p  
 horned: Cope, 74q  
 Phenacodus: Cope, 83 w, 86d, f, r, 89o; Osborn,  
 98d; reconstruction: Osborn, 97j; and  
 Periptychus, brains: Cope, 83c  
 Phenacodus primaevus: Osborn, 98o  
 Phoca groenlandica, Russell Co., Ontario:  
 Grant, 83  
 Phoca, Virginia and South Carolina: Leidy,  
 56m  
 Phylogeny: Minot, 98; Osborn, 93, 98h; anthro-  
 poids: Gregory (W K), 16a  
 Pineal eye, Mesozoic Mammalia: Osborn, 87d  
 Pinnepedia: Kellogg, 18  
 Plagiaulacidae, Eocene: Cope, 81u, 82s, 86n  
 Platygonus: Leidy, 83a; Wagner, 03  
 Kansas: Peterson, 14b; Williston, 94e  
 Mexico: Dugès, 87  
 New York: Leidy, 89g  
 Pliocene, Texas: Gidley, 03a  
 restoration: Williston, 94d  
 Platygonus compressus: Le Conte (J L), 48



## Mammalia—Continued.

- Pleistocene faunas: Hay (O P), 12b, 15, 16c  
 Hawver Cave, Cal.: Stock, 18  
 Kansas and Oklahoma: Cope, 95b  
 Maryland: Gidley, 13c; Lucas (F A), 06  
 Nebraska: Matthew, 02f  
 ruminants, Ovibos and Botherium: Gidley, 08  
 Pliocene faunas: Merriam, 17b  
 Mexico: Felix, 91  
 western Nebraska: Matthew (W D), 09e  
 western United States: Merriam, 17a  
 Plihippus, California: Merriam, 16a  
 Plihippus lullianus, S. Dak.: Troxell, 16  
 Poebrotherium: Cope, 74o; Leidy, 48a; Troxell, 17  
 Pogonodon: Cope, 80e  
 Pontogeneus, Louisiana: Leidy, 52g  
 Pontoleon, Miocene, Oregon: True (F W), 05  
 Pontolis, n. n. for Pontoleon: True (F W), 05b  
 Porto Rico: Anthony, 16a  
 Preptoceras, California: Furlong, 05  
 Primates: Gregory (W K), 12; Osborn, 01f; Wortman, 01b  
 adaptations of: Loomis, 11b  
 Eocene: Osborn, 02b  
 phylogeny: Brown (A E), 01  
 Wasatch and Wind River regions: Loomis, 06  
 Proboscidea: Cope, 89c; Fairchild, 87; Hays, 43a; Lucas (F A), 02b; Osborn, 00e  
 Eocene: Cope, 72s  
 evolution in North America: Osborn, 03e  
 generic nomenclature: Matthew (W D), 18f  
 ligamentum teres: Barbour, 15a, 16d  
 phylogeny: Osborn, 18c  
 Procamelus, Miocene, Montana: Douglass, 09; Nebraska: Leidy, 58f  
 Procamelus occidentalis, brain: Cope, 78c  
 Procyonidae: Wortman, 00  
 Promerycochoerus, Nebraska: Peterson, 14d  
 Proptoceras, Texas: Troxell, 15a  
 Prorastomus, Jamaica: Owen (R), 55b  
 Prorosmarus alleni, Miocene, Virginia: Berry 06e  
 Protapirus, Miocene, South Dakota: Wortman, 93a  
 Proterix, South Dakota: Matthew (W D), 03c  
 Protoceras: Marsh, 97c; Osborn, 93h; Scott (W B), 95e; Miocene: Marsh, 91; Osborn, 92a; (see also Syndoceras).  
 Protoceratidae: Marsh, 97b  
 Protogonodon: Earle, 93a  
 Protohippus: Leidy, 70u  
 Protolabis, Colorado: Cope, 76f  
 Protopytchus, Uinta beds, Utah: Scott (W B), 95d  
 Protosorex, White River beds: Scott (W B), 95c  
 Puerco fauna, New Mexico: Cope, 82y, 83n, r, za, zf, 84d, 88d; Matthew (W D), 97a; Osborn, 95; ungulates: Earle, 93b  
 Psittacotherium, Puerco beds, N. Mex.: Cope, 82l, 87e; Wortman, 96a  
 Ptilodus: Gidley, 09  
 Puma, Illinois: Leidy, 88  
 Pyrotherium fauna: Loomis, 14, 14a

## Mammalia—Continued.

- Quadrumanus, Eocene, Wyoming: Marsh, 72o; phylogeny: Cope, 88m  
 Quadrupedal locomotion: Gregory (W K), 12a  
 Quaternary: Torre, 10a, b  
 Mississippi Valley: Wyman, 62  
 southern California: Furlong, 06; Merriam, 06a, d  
 Raccoon, Pleistocene, California: Gidley, 06b  
 Rancho La Brea, Cal.: Merriam (J C), 13e; Canidae: Merriam (J C), 12  
 Reindeer: Leidy, 59g; New York: Fisher, 59  
 Rhabdosteus latiradix: True, 08c  
 Rhinoceros: Cope, 79b, p, t; Leidy, 65c, 70f; Osborn, 98a; Scott (W B), 83, 84a  
 Florida: Leidy, 85  
 Loup Fork beds, Nebr.: Hatcher, 94a; Cope, 78z  
 Miocene: Osborn, 04d  
 Nebraska: Barbour, 06, 06f; Cook (H J), 09b; Leidy, 52d; Pohlig, 94  
 New Jersey: Marsh, 70c  
 New Mexico: Cope, 84k  
 Oligocene and Miocene, North Dakota and Montana: Douglass, 08a  
 phylogeny: Osborn, 00a  
 Pliocene: Matthew (W D), 18i  
 Rhinoceros occidentalis: Leidy, 50a  
 Rhinocerotidae: Cope, 80n; Scott (W B), 83; Diceratherium: Hatcher, 97; Miocene: Loomis, 08a  
 Rise in North America: Osborn, 93  
 Rocky Mountain region: Marsh, 71f  
 Rodent, Miocene, Kansas: Gidley, 07; Wayne Co., N. Y.: Wyman, 46a  
 Rodentia: Cope, 83o; Leidy, 71k; Peterson, 05  
 dentition: Cope, 88k  
 list: Allen (J A), 77  
 Miocene: Cope, 81d, o  
 Nevada Tertiary: Kellogg, 10  
 Paramys and Ischyromyidae: Matthew (W D), 10a  
 Pleistocene, California: Kellogg, 12  
 Porto Rico: Anthony, 17  
 Wasatch and Wind River beds: Loomis, 07  
 Rosmarus virginianus: Rhoads, 98a  
 Ruminant, Pleistocene, New Mexico: Gidley, 06c  
 Saber-toothed cats: Cope, 80e; Williston, 98e  
 Saskatchewan, Swift Current River: Cope, 85k, 89h  
 Saurocetus: Agassiz (L), 48  
 Scaphoceros tyrrelli, Klondike region: Osgood, 05a  
 Seacow, Miocene, Maryland: Palmer (W), 17  
 Sea lion, Miocene, Oregon: True (F W), 09  
 Sea otter (Latax): Taylor (W P), 14  
 Seal remains, Calvert Cliffs, Md.: True (F W), 05a, 06  
 Miocene, Oregon: Condon, 06; Wortman, 06  
 post-Pliocene, Ottawa River: Leidy, 56f  
 Siestan fauna, California: Merriam (J C), 13d  
 Sigmogomphius, rodent, California: Merriam, 96  
 Sinopa: Matthew (W D), 05c; osteology: Matthew (W D), 06



**Mammalia—Continued.**

- Sirenia*: Cope, 90e  
 California: Marsh, 88a  
 Tertiary, Porto Rico: Matthew (W D), 16f  
 Skull elements in Tetrapoda, nomenclature: Gregory (W K), 16d  
 Skull measurements: Osborn, 13d  
 Snake Creek beds, Nebraska: Matthew (W D), 18; Sinclair, 15  
 South Carolina: Leidy, 90b  
   post-Pliocene: Holmes (F S), 58  
 Zeuglodon: Tuomey, 47  
 South Dakota: Leidy, 56e, g, i, p; Marsh, 91d  
   Miocene: Matthew (W D), 04b  
   Oligocene: Matthew (W D), 05  
 Squalodon, South Carolina: Allen (J A), 87  
 Steneofiber, New Mexico: Cope, 75j  
 Stenomylus: Loomis, 10; Peterson, 12a  
 Stenomylus hitchcocki, mounted skeleton: Peterson, 11a  
 Sternum, origin: Williston, 16d  
 Strepsicrine antelopes: Merriam, 09a  
 Stylacodon, Jurassic: Marsh, 79e  
 Stylinodontia, Eocene edentates: Marsh, 97  
 Suilline remains, Miocene, Nebraska: Peterson, 06  
 Sundry forms: Hatcher, 01a  
 Supernumerary tooth: Warren (J C), 55  
 Sus, North Carolina: Cope, 73zf  
 Symborodon, Colorado: Cope, 74j, 75k  
 Symbos cavifrons, Michigan: Case, 15c  
 Syndoceras, Sioux Co., Nebr.: Barbour, 05, 05a, 06c  
 Syndoceras and Protoceras skulls compared: Barbour, 06d  
 Synoplotherium, Eocene: Cope, 72r  
 Systemodon: Cope, 81x  
 Taeniodonta: Cope, 76b, 82h, x  
 Taeniolabis: Cope, 82x  
 Taligrada: Osborn, 98e  
 Tapir: Earle, 96a; Hatcher, 96; Leidy, 49  
   Cenozoic, Pacific coast region: Merriam (J C), 13  
   evolution: Earle, 93  
   Miocene, South Dakota: Marsh, 94i  
   North Carolina: Hays, 52  
   Oregon: Sinclair, 01  
   Pleistocene, Florida: Sellards, 18b  
*Tapirus haysii*: Leidy, 52j  
*Taxeopoda*: Cope, 82w  
*Teeth*, evolution, bearing on phylogeny: Osborn, 93i  
   molar, development: Cope, 83v  
   origin: Osborn, 97d  
   premolar: Scott (W B), 93a  
   sectorial, of Carnivora, origin: Cope, 88j  
   succession: Osborn, 93e  
   tritubercular: Cope, 83h  
 Teleoceras: Osborn, 98b; Nebraska Miocene: Olcott, 09  
 Telmatocyon, Bridger beds: Marsh, 99a  
 Telmatotherium: Hatcher, 95  
 Temnocyon, Oregon: Eyermann, 94, 96  
 Tennessee, Memphis: Wyman, 50, 50d  
 Tephrocyon: Merriam (J C), 13c; Nebraska: Cook (H J), 14a

**Mammalia—Continued.**

- Tertiary: Cope, 70f, 78i, 84, 15; Marsh, 73c, 74b, 90c; Merriam, 14b; Scott (W B), 93  
 descriptions: Marsh, 72g  
 Mohave Desert, Cal.: Merriam (J C), 13g  
 Tetheopsis: Cope, 86l; Scott (W B), 86b  
 Tetrabelodon: Cope, 93c, g; Nebraska: Barbour, 14d, 16e, 17a  
 Tetracaulodon: Hays, 34; Koch, 42  
   New York, Orange Co.: Godman, 30  
   (Tetrabelodon), Loup Fork beds: Wagner, 99  
 Tetracaulodon ohioiticum, tusk: Pohlig, 12  
 Tetralophodon campester, Loup Fork beds: Cope, 78q  
 Texas, Blanco beds: Cope, 92e, n  
   Brazos River: Jeffries, 57  
   Rock Creek: Troxell, 15  
   Washington Co.: Leidy, 60c  
 Theromorpha, relations to Mammalia: Cope, 85d  
 Thlaedon: Cope, 92l; Matthew (W D), 16  
 Thylacoleo: Cope, 82u  
 Ticholeptus beds fauna: Cope, 86m  
 Tiffany beds fauna: Matthew (W D), 18h  
 Tiger, Florida: Leidy, 89a  
 Tillodont skull, Huerfano Basin, Colo.: Granger, 18  
 Tillodontia: Marsh, 75a, 76a  
 Tinoceras: Cope, 86l; Marsh, 72k, l, 73 g, h; Scott (W B), 86b  
 Titanoides, North Dakota: Gidley, 17  
 Titanotherium, Uinta Eocene: Peterson, 14  
 Titanotherium restoration: Gregory (W K), 12c  
 Titanotheres: Osborn, 05h, n, 11a, 13b  
   Eocene and Oligocene: Osborn, 08b  
   evolution: Osborn, 08  
   four phyla: Osborn, 02a  
   Lambdotherium, Eotitanops: Osborn, 13b  
   Oligocene: Osborn, 02a, 16  
   phylogeny: Osborn, 97h, 14a, e  
   Uinta formations: Douglass, 10; Riggs, 12  
 Titanotherium: Hatcher, 01b; Leidy, 74b; Osborn, 96b; cranial evolution: Osborn, 96  
 Titanotherium dispar, Sioux Co., Nebr.: Hatcher, 02a  
 Titanotheroid, Uinta basin Eocene: Gregory (W K), 12b  
 Tomiopsis, Texas: Cope, 93a  
 Tooth structure, types: Allen (H), 86  
 Tooth-cusp development: Gidley, 06  
 Torrejon mammals, Montana: Douglas, 02  
 Toxodon, Nicaragua: Leidy, 86c  
 Toxodontia: Cope, 97c  
 Trachodon: Osborn, 12d  
 Trachodontidae, osteology of manus: Brown (B), 12a  
 Triassic, Connecticut Valley: Lull, 17a  
 Trigonias: Hatcher, 01a; Miocene, South Dakota: Lucas (F A), 00a  
 Triisodon, New Mexico: Cope, 81q, 83f  
 Triplopus: Cope, 80i  
 Tritubercular theory: Osborn, 04h, m  
 Tritubercular type of mammalian dentition, origin: Osborn, 87g  
 Trituberculate molar teeth: Cope, 84h, zd  
 Trituberculy: Gregory (W K), 16; Osborn, 97e



**Mammalia—Continued.**

- Tritylodon: Osborn, 87f; pineal eye: Osborn, 87e
- Tupaiidae and Notharectus: Gregory (W K), 13b
- Tyrannosaurus and Allosaurus: Osborn, 12c
- Ungulata: Cope, 75s, 83zb; Pavlow, 87
- ancestry: Cope, 87j
- classification: Cope, 82b, 83ze
- Eocene, Wyoming: Cope, 73y
- evolution: Fairchild, 94b
- foot structure, origin: Cope, 81k
- Uinta fauna: Osborn, 95a; Scott (W B), 88
- Uintatherium: Cope, 83f, p; Osborn, 81
- Ursus, Mississippi: Leidy, 53d; Wortman, 83a
- Ursus procerus, Ohio: Miller (G S), 99
- Utah, Uinta beds: Scott (W B), 90
- Walker Lake: Merriam (J C), 13f
- Wasatch beds: Loomis, 07a
- Vermont: Thompson (Z), 50
- Virginia, Balaena: Leidy, 51c
- Richmond: Wyman, 50a
- Saltville Valley: Peterson, 17a
- Viverridae: Wortman, 00
- Vulpes, New York: Redfield, 50
- Walrus: Leidy, 57e; Rhoads, 98a
- Accomac Co., Va.: Mitchill, 27
- Long Branch: Newberry, 70g
- Maine: Anon, 78a
- Virginia: Cope, 74n
- Wasatch and Wind River faunas: Matthew (W D), 18a
- Wasatch beds: Cope, 76; Osborn, 92; perissodactyls: Wortman, 96
- Western States: Marsh, 71e
- Whale (Eschrichtus), California: Cope, 72k
- Quaternary, New Brunswick: Honeyman, 74a; Ontario: Dawson (J W), 83b
- Whales, ancestors of: Gilbert (J Z), 08; Eocene: Lucas (F A), 04d
- Whales allied to Balaenoptera: True (F W), 12, 12a
- White River beds: Cope, 87k, 91c; Osborn, 94; Scott (W B), 87, 90a; horses: Farr, 96; perissodactyls: Osborn, 95b; Wortman, 96; selenodonts: Scott, 99
- Wind River beds: Cope, 80o, q; Osborn, 92
- Wyoming: Cope, 73ze; Leidy, 70o, q, 71d, 72d, e, k, m, 73b; Marsh, 71f; Peck, 04a
- camels of Harrison beds: Loomis, 11
- Eocene: Cope, 73n, 82a; Granger, 10
- Niobrara Co., Lance fauna: Lull, 15c
- Sweetwater region: Leidy, 73
- Xenarthra (Edentata), Pleistocene, Texas: Hay (O P), 16
- Yale collection: Lull, 13
- Zalambdodont insectivore, Eocene, New Mexico: Matthew (W D), 13
- Zanycteris (Paleocene bat), Colorado: Matthew (W D), 17a
- Zeuglodon: Gidley, 13b; Koch, 50, 51; Lucas (F A), 95, 95a, 00b, 04e; Muller, 47a, c, 49, 51; Owen (R), 39; Rogers (H D), 45; Warren (J C), 54b
- discovery: Koch (A C), 51a
- Mississippi: Koch (A C), 57; Natchez: Bartlett, 46
- Washington Co., Ala.: Wyman, 50f

**Mammalia—Continued.**

- Zeuglodon cetoides: Bouvé, 59; Muller, 47b
- Zeuglodonts: Cope, 69b
- Zygodon, Alabama: Buckley, 43
- Mammoth Cave. *See* Caves.
- Man, fossil.
- Antiquity: Cope, 83e; Dawson (J W), 81h; Leverett, 90a; Lewis (H C), 83f; Mudge, 79a; Penck, 09; Shaler, 93b; Shimek, 17; Wright (G F), 92d
- in America: Cope, 95h; Holmes (W H), 18; McGee, 93f; Whittlesey, 69b; Wissler, 16
- in California: Merriam, 15i
- in eastern America: Lewis (H C), 80r
- Birthplace of man: Williston, 10d
- British Columbia, Savona: Drysdale, 16; Moncton, 13
- Calaveras skull: Blake (W P), 99a; Boutwell, 11; Hitchcock (C H), 70f; Merriam, 10d; Whitney, 67a, 80; Winslow, 73
- California: Holmes (W H), 99
- cave remains: Merriam, 09b
- Rancho La Brea: Merriam, 14a
- Table Mountain: Winslow, 57
- Contemporaneity with Mylodon: Wilson (T), 92
- Delaware Valley, Trenton gravels: Belt, 78; Hollick, 97d; Holmes (W H), 93, 97; Hrdlička, 02; Lewis (H C), 80n, 81a; Martin (D S), 85; Wright (A A), 93b; Wright (G F), 97, 11a
- Earliest traces in North America: Newberry, 70c
- Early man in America: Volk, 12
- Evolution: Barrell, 17a
- Florida, Vero: Chamberlin (R T), 17a; Hay (O P), 17d, 18, 18a, b; Hrdlička, 17, 18; MacCurdy, 17, 17a; Nelson, 18; Sellards, 16a, b, d, 17, 17b, d; Sterns, 18; Wieland, 18b
- General: Abbott (C C), 83a, 89; Balch, 17; Brown (E), 77; Chamberlin (T C), 03; Corral, 17; Dawson (J W), 80; Foster, 67; Haynes, 80; McGee, 93a; Osborn, 15; Rothermal, 94; Sternberg, 03b; Winchell (A), 78; Wright (G F), 05b
- Glacial man: Belt, 76; Lull, 12c; Upham, 93k; Wright (G F), 91c, 92f, 93e, h, i, 95c, 96b, 03a, 07, 08
- Human implement (?) in gravel, Philadelphia: Lewis (H C), 83h
- Human relics in drift, Ohio: Claypole, 96d
- Interglacial American man: Wilson (D), 77
- Kansas paleoliths: Winchell (N H), 13
- Lansing skeleton, Kansas: Fowke, 07; Holmes (W H), 02; Hrdlička, 03; Owen (L A), 03; Pearson, 03; Shimek, 03; Upham, 02b, c, d, e, f, 03, 03d; Williston, 02h, 03b, 05a; Winchell (N H), 02b, 03a, c; Wright (G F), 03, 03b
- geologic relations: Chamberlin (T C), 02
- rheumatoid arthritis in: Parker (C A), 04
- Loess and the antiquity of man: Shimek, 17
- Man and the glacial period: Wright (G F), 92
- Massachusetts, Boston: Shimer, 18; Worcester Co.: Putnam, 85
- Mexico: Bárcena, 85, 86a, b, 97; Newberry, 86g; Peñon: Castillo, 85a, 86c



**Man, fossil—Continued.**

- Minnesota: Babbitt, 84; Holmes (W H), 93b  
 Mississippi, Natchez: Leidy, 89c  
 Nebraska: Barbour (E H), 06a, 07, 07d, e, f; Blackman, 07; Gilder, 07, 07a; Holmes (N), 76; Osborn, 07f; Shimek, 08  
 Neocene man in the Sierra Nevada: Sinclair, 08  
 Nicaragua, footprint: Brinton, 88  
 Ohio, traces in: Holmes (W H), 93a; Wright (G F), 93k; southwestern: Leverett, 93a  
 Origin: Cope, 85c; Gregory (W K), 16a; and antiquity: Upham, 02e, 06b; Wright (G F), 12  
 Paleolithic man: McGee, 88c  
 Phylogeny: Cope, 88m, 93f  
 Place of origin: Wright (G F), 09a  
 Pleistocene: Reeds, 15a  
 Pliocene man: Southall, 82  
 Preglacial: Claypole, 93c; Winchell (N H), 09b  
 Prehistoric man: Hutchinson, 97; in California: Wright (G F), 08a  
 Pre-Indian inhabitants of North America Winchell (N H), 07a  
 Restoration of paleolithic man: Lull, 10b  
 Skeletal remains of early man in North America: Hrdlička, 07  
 Tertiary: Morse (E S), 84  
 Tertiary Mammalia, relation to: Cope, 75z  
 West Indies, Orchilla: Leidy, 65b

**Manganese.**

- Arizona: Blake (W P), 10  
 Arkansas, Caddo Gap and De Queen quadrangles: Miser, 17  
 British Columbia, Slokan district: Bancroft (M F), 18  
 California: Aubury, 06; Boalich, 17; Bradley (W W), 18; Louderback, 18; San Bernardino Co., Owl Head: Mann, 16  
 Canada: Denis, 03b; Ingall, 91; Young (G A), 09  
 Colorado, Eagle Co., Red Cliff, manganiferous iron ore: Umpleby, 17b  
 Colorado River desert region: Jones (E L), 18  
 Costa Rica: Spilsbury, 18; Yonge, 17  
 General: Demaret, 05; Harder, 08; Hewett, 13, 17b; Joseph, 15; Palmer (I A), 18; Penrose, 91; Watson, 18a; Weeks, 86a  
 Geologic occurrence: Runner, 16a  
 Georgia: McCallie, 10; Watson (T L), 09a; Anon, 18a; Ellijay quadrangle: La Forge, 13  
 Iron, association with, in sedimentary rocks: Penrose, 93a  
 Kansas, central, Dakota sandstone: Whitaker, 17  
 Lateritic ore deposits: Miller (W G), 17a  
 Mexico, Durango: Rangel, 11; Lower California, Mulege: McQuesten, 16; Wallace (H V), 11, 11b, 16  
 Montana, Butte: Pardee, 18b  
 Madison Co.: Pardee, 18c  
 Philipsburg: Umpleby, 17c  
 New Brunswick: Ells, 08a; Bathurst district: Young, 11a  
 Newfoundland: Dale (N C), 15  
 Nicaragua, Matagalpa district: West, 09a  
 North America: Penrose, 91a

**Manganese—Continued.**

- Nova Scotia, Hants Co.: Jennison, 04; New Ross: Kram, 12b  
 Oklahoma, Arbuckle Mountains: Reeds, 10  
 Oregon: Anon, 18b  
 South Carolina: Sloan, 08  
 Tennessee: Ashley, 10b; Nelson (W A), 11b; Watkins, 16; Bradley Co.: Purdue, 18  
 Texas, Llano-Burnet region: Paige, 11, 12  
 United States: Eckel, 05b; Harder, 09b, 10; Hewett, 13b; U S G S, 83  
 Vermont, South Wallingford: Jones (R W), 18  
 Virginia: Ball (S M), 09; Watson, 07e; Shenandoah Valley: Hewett, 18  
 Washington, northern: Jenkins, 18  
 Mangroves in southern Florida: Vaughan, 09a  
 Manhattan district, Nev.: Emmons (W H), 07; Jenney, 09b; Rice (C T), 06c  
 Manitoba.  
 Amber, Cedar Lake: Tyrrell, 91a  
 Amisk-Athapapuskow Lake area: Bruce, 16  
 Assiniboine valley: Bryce, 91a  
 Churchill and Nelson rivers: Bell (R), 80  
 Churchill River region: Alcock, 16; McInnes, 13a  
 Duck and Riding Mountains, western Manit.: Tyrrell, 88  
 General: Bryce, 07; Hector, 61; Scoble, 97  
 Hayes River: Tyrrell, 16  
 Hudson Bay region: Bell (R), 81; Savage, 16d  
 Lake of the Woods: Bryce, 97  
 Lake Winnipeg, country north of: Tyrrell, 97a  
 Lake Winnipeg islands: Panton, 86  
 Lake Winnipeg region: Tyrrell, 92a, 98  
 Lake Winnipeg-Burntwood River region: Dowling, 02; Tyrrell, 02  
 Lake Winnipegosis region: Tyrrell, 89, 90, 96a  
 Nelson River basin: McInnes, 13a; Tyrrell, 16  
 Northern Manit.: Tyrrell, 95  
 Red River valley: Bryce, 91a; Hind, 58; Pantan, 83  
 Western Manit.: Tyrrell, 91  
*Economic geology.*  
 Amisk-Athapapuskow Lake area: Bruce, 16  
 Building and ornamental stones: Parks (W A), 16  
 Cement materials: Wells, 05b  
 Clay: Keele, 11, 15a; Ries, 11a; Wells, 05  
 Fort Garry: Harrington (B J), 73b  
 Swan River valley: Johnston (W A), 18a  
 Clay and shale deposits: Ries, 12c  
 Coal fields: Dowling, 07a, 09; Turtle Mountain: Dowling, 03  
 Copper: Campbell (J A), 17  
 Flin-Flon Lake: Callinan, 17  
 Schist Lake district: Bruce, 18a  
 Flin-Flon Lake district: Callinan, 17  
 General: Harding, 16  
 Gold: Campbell (J A), 17  
 Manigotagan district: De Lury, 16  
 northern Manit.: Bruce, 16a  
 Rice Lake district: Harding, 14; Wallace (R C), 13b  
 southeastern Manit.: Dresser (J A), 17; Marshall, 18  
 Star Lake area: Marshall, 18a  
 Wekusko Lake area: Alcock, 18; origin: Alcock, 18a



**Manitoba—Continued.***Economic geology—Continued.*

- Gold Lake district: Packard (G A), 16  
 Gypsum: Kindle, 14a; MacLean, 14; Wallace (R C), 15; Gypsumville: Wallace (R C), 14a  
 Herb Lake district: Bruce, 18c  
 Hudson Bay Railway: Johnston (W A), 18  
 Limestone: Wells, 05a  
 Molybdenite, Falcon Lake area: Bruce, 18b; De Lury, 17  
 Northern Manit.: Bruce, 18c; Tyrrell, 17a; Wallace (R C), 17  
 Northwestern Manit.: Wallace (R C), 16  
 Saline springs: Cole (L H), 14  
 Salt: MacLean, 14; Wallace (R C), 15  
 Sand, Swan River valley: Johnston (W A), 18a  
 Schist Lake district, northern Manit.: Bruce, 17, 18a, c  
 Shale: Keele, 15a; Wells, 05  
 Southeastern Manit.: Marshall, 18; Wallace (R C), 17a  
 Southwestern Manit.: Dowling, 03  
 Star Lake area: Marshall, 18a  
 The Pas region: De Lury, 16a  
 Tungsten, Falcon Lake: De Lury, 18  
 Wekusko Lake area, northern Manit.: Alcock, 18; Bruce, 17

*Historical geology.*

- Amisk Lake district: Bruce, 15  
 Amisk-Athapapuskow Lake area: Bruce, 16, 18  
 Assiniboine valley: Bryce, 91a  
 Borings: Dawson (G M), 87b; Tyrrell, 92b  
 Deloraine: Tyrrell, 93b  
 Swan River: Selwyn, 77a  
 Winnipeg: McLearn, 15a  
 Cambro-Ordovician, eastern Manit.: Dowling, 95  
 Churchill River region: Alcock, 16; Bell (R), 80; McInnes, 13a  
 Cretaceous: Tyrrell, 90b  
 Devonian: Kindle, 14a; Snake Island and Lake Winnipegosis: MacLean (A), 13  
 Falcon Lake area: Bruce, 18b  
 Forty-ninth parallel: Dawson (G M), 75  
 General: Bell (R), 73, 74, 76; Billings, 59h; Collins (W H), 13c; Dowling, 13; Hind, 59, 60; Malcolm, 13; Selwyn, 73; Spencer (J W), 76; Tyrrell, 92b; Wallace (R C), 15; Whiteaves, 80b  
 Hayes River: Tyrrell, 16; Ordovician deposits: Tyrrell, 13  
 Hudson Bay Railway: Johnston (W A), 18  
 Hudson Bay region: Bell (R), 81  
 Lake Winnipeg region: Dowling, 00a; Moore (E S), 14; Tyrrell, 92a, 97a, 98, 00  
 Lake Winnipeg-Burntwood River region: Dowling, 02; Tyrrell, 02  
 Lake Winnipeg-Hudson Bay region: Bell (R), 79a; Low, 87  
 Lake Winnipegosis: Tyrrell, 90  
 Manigotagan gold district: De Lury, 16  
 Nelson River basin: Bell (R), 80; McInnes, 13a; Tyrrell, 16  
 Northern Manit.: Bruce, 16a, 18c; Wallace (R C), 17  
 Ordovician: Wallace (R C), 13

**Manitoba—Continued.***Historical geology—Continued.*

- Pembina Mountain, southern Manit.: MacLean, 15, 16  
 Pre-Cambrian: Miller (W G), 14  
 Red River valley: Bryce, 91a; Panton, 83; Ordovician: McCharles, 87; Panton, 84a  
 Ripple-marked limestone: Kindle, 12c  
 Saskatchewan River valley: Kindle, 15a  
 Schist Lake district, northern Manit.: Bruce, 17, 18a, c  
 Silurian: Kindle, 14a  
 Hudson Bay region: Savage, 18a  
 Winnipeg: Panton, 83a  
 Southeastern Manit.: Dresser (J A), 17; Marshall, 18; Wallace (R C), 17a  
 Southern Manit.: Dawson (G M), 81e  
 Southwestern Manit.: Dowling, 03  
 Tertiary lignitic formation, forty-ninth parallel: Dawson (G M), 74  
 Wekusko Lake area, northern Manit.: Alcock, 18; Bruce, 17  
 Western Manit.: Tyrrell, 92  
 Winnipeg basin, Pleistocene: Tyrrell, 91c  
 Winnipeg district: McCharles, 87a  
 Winnipeg to Cochrane: Collins (W H), 13d  
 Winnipeg to Malachi: Collins (W H), 13b

*Paleontology.*

- Aphylostylus, Silurian: Whiteaves, 04b  
 Bryozoa and Ostracoda, Ordovician: Ulrich, 89  
 Cambro-Silurian: Whiteaves, 90  
 Cretaceous: Whiteaves, 89b  
 Devonian: Billings, 59i; MacLean (A), 13; Whiteaves, 80, 91a, 92  
 Entomostraca: Jones (T R), 89a  
 Foraminifera, Cretaceous: Dawson (G M), 74b; Dawson (J W), 76b; Tyrrell, 91b  
 Gastropoda, Trenton: Whiteaves, 93a  
 Grand Rapids region: Calvin, 92a  
 Hayes River region, Ordovician: Tyrrell, 13  
 Larix from interglacial: Penhallow, 92a  
 Lignite plants, Souris River: Dawson (J W), 80e  
 Ordovician: Parks (W A), 15; Whiteaves, 81  
 Lake Winnipeg region: Whiteaves, 97  
 Shamattawa River: Parks, 13  
 Stony Mountain: Whiteaves, 95a  
 Orthoceratidae, Trenton, Winnipeg basin: Whiteaves, 92a  
 Radiolaria, Cretaceous: Tyrrell, 91b; Pierre formation: Rüst, 92  
 Saskatchewan River valley: Kindle, 15a  
 Sceptropora: Ulrich, 88c  
 Silurian: Billings, 59i; MacLean (A), 13; Whiteaves, 80, 06; Hudson Bay region: Savage, 18a  
 Trenton, Lake Winnipeg: Whiteaves, 96

*Petrology.*

- Lake Winnipeg region: Moore (E S), 14

*Physical geology.*

- Boulders corroded by brine: Wallace (R C), 17b  
 Pseudobrecciation in Ordovician limestones: Wallace (R C), 13

*Physiographic geology.*

- Assiniboine Valley, surface geology: Bryce, 91  
 Baseleveling, Tertiary and Quaternary: Upham, 94m



## Manitoba—Continued.

*Physiographic geology*—Continued.

- Birds Hill, esker near Winnipeg: Upham, 10  
 General: Dowling, 16  
 Glaciation: Dawson (G M), 75a  
 Lake Agassiz: Johnston (W A), 17b; Upham, 90, 96; ancient outlet: Treherne, 81  
 Pleistocene, Lake Athabasca region: Tyrrell, 93a  
 Prairies: Drummond, 88  
 Red River valley: Dowling, 01; surface geology: Bryce, 91  
 Southeastern Manit., Whitemouth River area, superficial deposits: Johnston (W A), 17a  
 Surface geology: Chalmers, 06

*Underground water.*

Winnipeg area: Tyrrell, 14c

Manitoulin area of Lake Huron: Foerste, 12c

## Manjak.

- Barbados: Ells, 11; Hovey, 08d  
 Trinidad: Ells, 11; San Fernando field: Craig, 05

Manlius formation, N. Y.: Schuchert, 03b

Manlius limestone: Prosser (C S), 07

Mannington oil field, W. Va.: White (I C), 92

Manti beds, Utah: Cope, 80g

Manuscript, preparation: Wood (G M), 16

Manzano fauna: Girty, 09c

Manzano group, N. Mex.: Lee (W T), 09b

Map making. *See* Cartography.

Maple Mountain district, Ont.: Ramsay, 09

Maple River: Willard, 06e

Maps. *See* Geologic maps.

Maquoketa series: Sardeson, 96; nomenclature: Sardeson, 97

Maquoketa shales: James (J F), 90a, e

## Marble.

Alabama: Prouty, 16

Alaska, Juneau, Skagway, and Sitka districts: Burchard, 14b

Experimental investigation into flow: Adams (F D), 01, 02, 10e

General: Bowles, 16; Burnham, 83; Hopkins (T C), 93; Prouty, 16

Missouri, southeastern: Broadhead, 82

New York: Newland, 16

Onyx marble: De Kalb, 98; Merrill (G P), 95

Southern States: Burchard, 12

Strength and structure: Perry (G W), 91

Tennessee, Hawkins Co.: Willis, 88

United States, western: Newberry, 88e

Marble Bay copper deposit, B. C.: LeRoy, 07

Marcus Island: Bryan, 03

Marcy, Oliver, biography: Crook, 99, 00

Marginal kames: Lewis, 85b

Marginal sedimentation: Cotton, 18

Marine clastics, diagnostic characteristics: Kindle, 17c

Marine currents and river deflection: Daly (R A), 01a

Marion stage of Kansas Permian: Beede, 09

Mariposa formation, breccias, Colfax, California: Moody, 17

## Markings on rocks.

- General: Cox (G H), 16; Dawson (J W), 73d; Hall, 43d, e; James (J F), 84, 85a, c; Newberry, 85b

Massachusetts, Turners Falls: Hitchcock (E), 57b

## Markings on rocks—Continued.

Mud flow markings: Whitfield, 00

Potsdam sandstone, Rainbow Falls, Lake Champlain: Dawson (J W), 83g

Raindrop impressions: Jackson, 52; Lyell, 51a

Rusophycus: Dawson (J W), 64a

Wisconsin, Green Bay: Desor, 52f

Worm burrows: Bonney, 03b

## Marl.

Alabama: Smith (E A), 92b

Definition: Stewart (C A), 09

General: Davis (C A), 01; Wilber, 83a

Georgia: McCallie, 10; Coastal Plain: Brantley, 16

Iowa: Beyer, 07b

Maryland: Ducatel, 35

Calvert Co.: Miller (B L), 07

Prince Georges Co.: Miller (B L), 11

St. Marys Co.: Miller (B L), 07a

Michigan: Russell, 00b

Mississippi: Logan (W N), 16

Natural history: Davis (C A), 00, 03

New Jersey, Philadelphia district: Bascom, 09a; southern: Pierce, 23a

Origin in peat bogs: Jackson, 59j

Quebec, Haliburton and Bancroft areas: Adams (F D), 10d

South Carolina: Sloan, 07, 08

United States: U S G S, 83

Virginia: Watson, 07e; Coastal Plain: Watson (T L), 12a

Marl lake: Davis (C A), 00a

Marsh, O. C., biography: Ami, 99e; Beecher, 99; Grinnell, 78, 10; Hague, 00; Joly (H), 01; Woodward (H), 99a; Wortman, 99

## Marshes.

Atlantic coast: Shaler, 95d

Formation: Penhallow, 07b

Fresh-water morasses: Shaler, 90

Maine: Bastin, 09a

Massachusetts, Cape Cod: Davis (C A), 12

New Jersey: Cook (G H), 67, 70, 71; coast: Merrill (F J H), 85

Salt marsh formation near Boston: Davis (C A), 10a

Salt marshes: Davis (C A), 11a; Townsend, 13

Tidal marshes: Warren (G M), 11

Virginia, Dismal Swamp: Davis (C A), 11b

Marquesas atoll: Vaughan, 14a

Marquette district: Van Hise, 01

Marshall fauna: Winchell (A), 65b

Marshall group: Winchell (A), 62, 69a

Marsupites, systematic position: Clark (A H), 11

Martinez formation, relations to Chico and Tejon: Dickerson, 11

Martinez group, California: Merriam, 97

## Martinique.

- General: Deckert, 02; Guppy, 13; Lacroix, 02b; Moreau de Jonnes, 17, 22; Sapper, 03j; Spencer (J W), 02

*Historical geology.*

General: Giraud, 02, 18

*Mineralogy.*

General: Lacroix, 03k

Redondite deposits: Lacroix, 05a

*Paleontology.*

Mollusca, Miocene: Cossmann, 13



**Martinique—Continued.***Petrology.*

**General:** Giraud, 18; Moreau de Jonnes, 17

**Mont Pelé,** andesites with enclaves: Lacroix, 02e

ash: Lacroix, 02a; Lévy, 02

cordierite: Lacroix, 03f

dust: Gillot, 03; Griffiths, 03

limestone blocks in tuff: Dublaneq-Laborde, 12

rocks ejected: Diller, 02d; Hillebrand, 02a; Lacroix, 02, 02d, k, 03g, 04a, 07

spine, composition: Lacroix, 07a

*Physical geology.*

**Earthquake:** Moreau de Jonnes, 59

**Erosion phenomena:** Hovey, 03g, 04e

**Mont Pelé:** Anderson (T), 02, 03a, 07, 08, 10; Deckert, 02; Heilprin, 03; Hill (R T), 02c, 05; Hovey, 03e, i, j, 05f; Jaggar, 02a, 03; Jefferson, 03a; Kewitseh, 02; Lacroix, 03e, 04; Lévy, 02a; Moreau de Jonnes, 20; Russell, 02b, c; Sapper, 05; Stübel, 03, 04; Wegener, 03, 03a, 04

condition in 1903-04: Hovey, 03d, 04g; in 1908: Hovey, 09h

eruptions, 1902: Anderson (T), 03, 07, 08, 10; Bergeat, 02; Berte, 02; Curtis, 03a; Deckert, 03; Geinitz, 02; Gerland, 02; Heilprin, 02, 03a, b; Hovey, 02d, e, f, 03h, 04j; Issel, 02; Jaggar, 02, 04b; Kolderup, 02; Lacroix, 02c, f, g, h, j, 03i; Lapparent, 05; Milne, 03; Nicholls, 02; Stübel, 04; Thierry, 02, 02a; Verri, 05; Verrill, 02

**January, 1903:** Lacroix, 03b

**July 9, 1902:** Divers, 02

1851: Jaggar, 04

eruption of black clouds: Lacroix, 03a

eruptions, former: Mercalli, 02

gases in fumaroles: Gautier, 03; Moissan, 02

nomenclature: Eastman, 05c

present condition: Hovey, 06, 06g, 15c

spine: Argall, 03; Gilbert, 04e; Heilprin, 03c, 04, 04a, 05a, 06a; Hovey, 03e, f, 04b; Jaggar, 04a; Russell, 03c, 04a, 05d

Mud flows: Lacroix, 03h

St. Pierre and Mont Pelé in 1908: Hovey, 09h

Secondary volcanic phenomena: Curtis, 03

Striations and U-shaped valleys: Hovey, 09

Sulphate of soda in fumaroles: Lacroix, 05c

Volcanic domes, formation of: Lacroix, 05

Martinsburg shale: Prosser, 00b

**Maryland.**

**Amber:** Hagen, 74

**Anne Arundel Co.:** Troost, 21

**Baltimore region,** mapping: Williams (G H), 87f

**Bare Hills,** Baltimore: Hayden, 33

**Bibliography:** Mathews, 97

**Cartography:** Mathews, 97, 98a

**Cecil Co.:** Ducatel, 38

**Diatomaceous earth,** Prince Georges Co.: Johnston (C), 74

**General:** Clark (W B), 94b; Emmons (S F), 93; Matthews, 98b; Pomeroy, 32

**Geological Survey:** Clark (W B), 17; reports: Clark (W B), 97, 98a, 07a; Md G S, 11

**Harpers Ferry region:** Mitchill, 14d

**Maryland—Continued.**

**Historical sketch:** Clark (W B), 97a

**Infusoria, localities:** Bailey (J W), 49

**Infusorial earth:** Sullivant, 75

**Kent Co.:** Ducatel, 38

**Mineral exhibit:** Md G S, 12

**Soils:** Higgins, 50

Calvert Co.: Bonsteel, 07a

St. Mary's Co.: Bonsteel, 07

*Economic geology.*

**Allegany Co.:** Clark (W B), 00a; Ducatel, 41

**Anne Arundel Co.:** Little, 17

**Barite:** Watson (T L), 15

**Building stone:** Clark (W B), 06c; Hawes, 84; Mathews, 98

Calvert Co.: Miller (B L), 07

Carroll Co.: Ducatel, 40

Cecil Co.: Mathews, 02

**Cement materials:** Clark (W B), 09; Eckel, 13; Mathews, 09

**Choptank quadrangle:** Miller (B L), 12

**Chrome ore,** Baltimore: Hayden (H H), 11

**Clay:** Clark (W B), 09; Ries, 02a

Calvert Co.: Miller (B L), 07

Prince Georges Co.: Miller (B L), 11

St. Marys Co.: Miller (B L), 07a

**Coal:** Campbell (M R), 06f; Clark (W B), 06e, 09; Martin (G C), 05; White (D), 02a

**Accident and Grantsville quadrangles:** Martin (G C), 08a

**Cumberland basin:** Hodge (J T), 69; Jones (H G), 81; Rankin, 55; Tyson, 69

**Elk Garden field:** Taff, 06a

**Frederick Co.:** Ducatel, 38

**Frostburg field:** Ducatel, 37; Tyson, 37

**Garrett Co.:** Martin (G C), 02

**George's Creek field:** Hall (R D), 11a; Parsons (F W), 06a

**Pawpaw and Hancock quadrangles:** Stose, 12b

**upper Potomac fields:** Stoeck, 09b

**Coal beds,** distribution and character: Clark (W B), 05b

**Copper:** Overbeck, 16; Weed, 11

Carroll Co.: Frazer, 81

Frederick Co.: Ducatel, 41; New London mine: Butler (B S), 14

**Liberty:** Jackson, 53g

**Sykesville:** Ansted, 57

**Diatomaceous earth,** Nottingham, Calvert Co: Johnston (C), 61

**Eastern Md.:** Ducatel, 36

**Feldspar deposits:** Bastin, 10b; Watts (A S), 16

**Frederick Co.:** Ducatel, 40

**Garrett Co.:** Martin (G C), 02

**General:** Clark (W B), 97b; Ducatel, 34, 35, 37, 37a; Higgins, 50; Tyson, 37a, 60

**Gold:** Clark (W B), 06c, 09; Johnson (W R), 51

Montgomery Co.: Emmons (E), 49a; Emmons (S F), 90a; Justice, 49

**Great Falls:** Weed, 05b

**Granite:** Clark (W B), 06e, 09; Keyes, 96k; Watson, 10, 10a

Cecil Co.: Grimsley, 94

Harford Co.: Ducatel, 39

**Infusorial beds:** Tyson, 60a



## Maryland—Continued.

*Economic geology*—Continued.

- Iron: Benton, 86a; Clark (W B), 06c, 09; Eckel, 13; Jackson, 57e; Singewald, 09, 11  
 Limestones: Clark (W B), 06c; Grasty, 14; Mathews, 09  
 Manganese: Hewett, 16  
 Marble: Clark (W B), 06c, 09; Jackson, 57e  
 Marl: Ducatel, 35  
 Mineral resources: Clark (W B), 06c, 09; Md C C, 09; Williams (G H), 93a  
 Montgomery Co.: Ducatel, 38  
 Patuxent quadrangle: Shattuck, 07c  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Prince Georges Co.: Miller (B L), 11  
 Road materials: Clark (W B), 99; Reid, 99  
 St. Marys Co.: Miller (B L), 07a; Shattuck, 07a  
 St. Marys quadrangle: Shattuck, 06a  
 Sand: Clark (W B), 09; Prince Georges Co.: Miller (B L), 11  
 Slate: Clark (W B), 09  
 Tolchester quadrangle: Miller (B L), 17  
 Washington Co.: Ducatel, 41

*Historical geology*.

- Accident and Grantsville quadrangles: Martin (G C), 08a  
 Albirupean formation: Heilprin, 88c; Lewis (H C), 88; Uhler, 88, 92  
 Allegany Co.: Ducatel, 41; O'Harra, 00  
 Anne Arundel Co.: Ducatel, 37; Little, 17; Owen (J S), 31  
 Archean: Williams (G H), 88c  
 Arundel formation: Mook, 16  
 Baltimore area: Clark (W B), 97f; Darton, 92a; Hayden (H H), 11; Uhler, 83; Williams (G H), 88e, 92a; Anon, 83a  
 Baltimore Co.: Ducatel, 39; Mathews, 05a  
 Blue Mountain: Walcott, 93b  
 Blue Ridge, structure, near Harpers Ferry: Geiger, 91  
 Brandywine formation: Clark (W B), 15a  
 Calvert Cliffs: Harris, 93a  
 Calvert Co.: Ducatel, 37; Shattuck, 07  
 Calvert formation: Berry, 16c  
 Cambrian: Walcott, 92c  
 Carroll Co.: Ducatel, 40  
 Catoctin belt: Keith, 94a  
 Cayugan, upper: Maynard, 10  
 Cecil Co.: Shattuck, 02; crystalline rocks: Bascom, 02  
 Cenozoic: Darton, 93d, 94g  
 Chesapeake Bay, head of: McGee, 88  
 Choptank quadrangle: Miller (B L), 12  
 Coal district: Martin (G C), 05  
 Coal Measures: Clark (W B), 02e, 05b; Prosser, 01c; correlation: Clark (W B), 02c, 05a  
 Coastal Plain Clark (W B), 09a; Shattuck, 98  
 Cockeysville marble: Mathews, 05a  
 Columbia formation: Darton, 93d; McGee, 93i; Salisbury, 93c  
 Cretaceous: Bryan, 89; Clark (W B), 95a, 97e, 07; Uhler, 88a, 89, 90  
 Anne Arundel and Prince Georges cos.: Clark (W B), 89  
 eastern shore: Roberts, 96  
 Cretaceous, Lower: Clark (W B), 11

## Maryland—Continued.

*Historical geology*—Continued.

- Cretaceous, Upper: Clark (W B), 16; correlation Clark (W B), 16a  
 Cumberland basin: Jones (H G), 81; Tyson, 69  
 Devonian: Schuchert, 03; Swartz, 10  
 Devonian, Lower: Schuchert, 13a; Swartz, 13  
 correlation: Swartz, 13a  
 historical review and bibliography: Prosser, 13a  
 paleogeography: Schuchert, 13  
 Devonian, Middle: Prosser, 13c  
 Devonian, Upper: Barrell, 13a; Prosser, 13e  
 correlation: Swartz, 13c  
 local sections: Swartz, 13c  
 Dikes, Baltimore: Williams (G H), 85c  
 Dover quadrangle: Miller (B L), 06  
 Eastern Md.: Clark (W B), 88b; Darton, 91b; Ducatel, 36  
 Eocene: Clark (W B), 96a, 01; Conrad, 35b; Harris, 94a; Heilprin, 81d; Uhler, 88a, 89, 90  
 Frederick Co.: Ducatel, 40; Keyes, 90g  
 Fredericksburg quadrangle: Darton, 94d  
 Frostburg region, Allegany Co.: Tyson, 37  
 Garrett Co.: Martin (G C), 02  
 General: Aikin, 34; Clark (W B), 94b, 95b, 97b, 99, 18a; Cope, 68e; Darton, 96d; Ducatel, 34, 37, 37a; Godon, 09; Morton, 29d; Tyson, 60; Williams (G H), 91e, 92c, 93, 94b  
 Geological map: Md G S, 07  
 Greensand deposits: Ashley, 17a  
 Harford Co.: Ducatel, 39  
 Harpers Ferry quadrangle: Keith, 94  
 Ilchester, Howard Co.: Hobbs, 88a  
 Jurassic: Lewis (H C), 80h  
 Limestones: Grasty, 14  
 McHenry formation: Uhler, 98  
 Magothy formation, northeastern Md.: Darton, 93b  
 Martinsburg shale: Prosser, 00b  
 Matawan formation: Clark (W B), 04b  
 Meso-Silurian deposits: Prouty, 08  
 Miocene: Clark (W B), 04; Lyell, 45a; Olsson, 17; Shattuck, 02a  
 Montgomery Co.: Ducatel, 38  
 Niagara formation: Uhler, 08; Cumberland: Uhler, 05  
 Nomini quadrangle: Darton, 96a  
 Onondaga formation: Kindle, 12  
 Ordovician, Piedmont: Bassler, 18a, b  
 Paleozoic formations, Allegany Co.: Prosser, 01b  
 Paleozoic history: Willis, 00  
 Patuxent quadrangle: Shattuck, 07c  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Piedmont area, northern Md.: Mathews, 02a  
 Piedmont formations: Mathews, 05  
 Piedmont limestones: Mathews, 09a  
 Piedmont Plateau: Mathews, 04; section: Keyes, 91a  
 Piedmont quadrangle: Darton, 96b  
 Pleistocene: Shattuck, 01, 02b  
 Pliocene and Pleistocene: Shattuck, 06  
 Portage and Chemung formations: Swartz, 08  
 Potomac formation: Bibbins, 95; Knowlton, 89a



## Maryland—Continued.

*Historical geology*—Continued.

- Potomac formations, correlations: Berry, 11b  
 Potomac group: Clark, 97d, 02b, d  
 Potomac River section, Eocene: Clark (W B), 96  
 Potomac Valley: McGee, 89  
 Prince Georges Co.: Miller (B L), 11  
 Quaternary gravels: Chester (F D), 84b  
 Romney formation: Prosser, 04a  
 St. Marys Co.: Shattuck, 07a  
 St. Marys quadrangle: Shattuck, 06a  
 Section through Appalachian Mountains: Swartz, 10a  
 Sections: Taylor (R C), 35d  
 Shenandoah limestone: Prosser, 00b  
 Silurian: Swartz, 16  
 South Mountain, volcanic rocks: Williams (G H), 92  
 Southern Md.: Clark (W B), 88a, 90, 91b  
 Tertiary: Conrad, 30; Heilprin, 80a, 84, 84a; post-Eocene: Heilprin, 82b  
 Tolchester quadrangle: Miller (B L), 17  
 Washington Co.: Ducatel, 41  
 Washington quadrangles: Darton, 01  
 Western Md.: Williams (G H), 91e

*Mineralogy*.

- Amphibole-anthophyllite, Baltimore: Williams (G H), 85e  
 Anglesite, cerusite, sulphur, Carroll Co.: Williams (G H), 91d  
 Baltimore and Hartford cos.: Tyson, 30  
 Baltimore area: Gilmor, 14; Williams (G H), 87  
 Carrollite: Faber, 52  
 General: Tyson, 37a; Williams (G H), 89b  
 Jones Falls, Baltimore: Powell (S L), 93  
 Meteorite, Garrett Co.: Foote (A E), 92a  
 Little Piney: Herrick (E C), 39  
 Nanjemoy: Carver, 25  
 Montgomery Co., chrome pits: Gill (A C), 89  
 Pyrite, Baltimore Co.: Williams (G H), 86c  
 Remingtonite, Carroll Co.: Booth, 52  
 Retinasphalt, Anne Arundel Co.: Troost, 25  
 Siderite and barite: Schaller, 06  
 Thulite, Baltimore region: Bibbins, 01  
 Zoisite, Baltimore region, Bibbins, 01

*Paleontology*.

- Amber-producing tree: Knowlton, 96e  
 Anne Arundel Co.: Owen (J S), 31  
 Anthozoa, Marlboro: Vaughan, 02c  
 Arcas: Sheldon, 17  
 Bauhinia, Magothy formation: Berry, 08b  
 Calvert flora: Berry, 16c  
 Carex: Berry, 05d  
 Cauda-Galli in the Niagara: Uhler, 08  
 Cecil Co., fossils (?) in quartzose rocks: Frazer, 80a  
 Cetacea, Miocene: Cope, 68f; True (F W), 08a  
 Chesapeake Bay, invertebrates: Meyer (O), 88a  
 Conus: Green, 30  
 Crepidula, St. Marys Co.: Morton, 29d  
 Cretaceous, Anne Arundel and Prince Georges cos.: Clark (W B), 89  
 eastern shore: Roberts, 96  
 floras: Berry, 14b  
 Lower: Lull, 11  
 Mollusca: Lull, 11  
 Upper: Clark (W B), 16b  
 Vertebrata: Lull, 11a

## Maryland—Continued.

*Paleontology*—Continued.

- Cretaceous fossils in Eocene: Bagg, 98  
 Cumberland: Shriver, 24  
 Cycadeoidea, Potomac formation: Ward, 94b, 97a; Wieland, 16  
 Delphinoid cetacean, Miocene: True (F W), 06, 11, 12  
 Delphinus: Harlan, 42b  
 Devonian: Ohern, 13a, b; Prosser, 13b, c; Schuchert, 13b, c; Swartz, 13b; Ulrich, 13c, d  
 Pelecypoda: Ohern, 13b  
 Pisces: Swartz, 13d  
 Trilobita: Ohern, 13b  
 Vermes: Kindle, 13; Ohern, 13a  
 Eland: Gidley, 13a  
 Eocene: Clark (W B), 01a; Conrad, 35b  
 Ferns, Frostburg: Bunbury, 46a  
 Flabellaria, Grove Point: Berry, 05b  
 Fossil cypress swamp: Bibbins, 98  
 Frederick Co.: Keyes, 90g  
 Fulgur: Conrad, 53  
 Glyphastraea, Tertiary: Duncan, 87  
 Infusoria: Bailey (J W), 45c, d; Ehrenberg, 44; Piscataway: Bailey (J W), 44  
 Ithaca fauna: Swartz, 07  
 Juglandaceæ, Pleistocene: Berry, 09c  
 Mammalia, Miocene, Charles Co.: Cope, 67b  
 Mesozoic flora, Coastal Plain: Berry, 06g, 10, 11j  
 Miocene: Clark (W B), 04a; Chesapeake Beach: Palmer (W), 15  
 drumfish: Smith (B), 09  
 marine Vertebrata: Cope, 95d, 96b  
 Mollusca: Conrad, 69d, f; Say, 24a  
 Calvert Cliffs: Conrad, 41b, 42  
 Miocene: Conrad, 66b, 68, 68a, 69b  
 Pliocene: Wagner, 39  
 Tertiary: Conrad, 30a; Lea, 33; Newton, 02  
 Oriskany: Schuchert, 89  
 Ostracoda, Paleozoic: Jones (T R), 05  
 Paleodevonian: Ohern, 07  
 Paleozoic fossils, list: Keyes, 91f  
 Plagiozamites, Coal Measures, Garrett Co.: Basler (H), 16  
 Plants, Lower Cretaceous: Berry, 11c; Pleistocene, Indian Head: Berry, 15f  
 Pleistocene: Clark (W B), 06, 06b; Hay (O P), 06c; Hollick, 06f; Lucas (F A), 06; Sellards, 06a; Ulrich, 06  
 Pleistocene cave deposit, near Cumberland: Gidley, 13c  
 Portage and Chemung faunas: Swartz, 08  
 Potomac flora: Ward (L F), 05; revision: Berry, 10f, 11f  
 Potomac formation: Bibbins, 95  
 Reptilia: Cope, 68l; Arundel formation: Lull, 11a  
 Reptilian tracks, Newark rocks, Frederick Co.: Mitchell (J A), 95  
 Seacow, Miocene: Palmer (W), 17  
 Seal remains, Calvert Cliffs: True (F W), 05a  
 Septastraea (Glyptastraea) Tertiary: Hinde, 88a  
 Southern Md.: Clark (W B), 88a  
 Tertiary: Conrad, 30; Heilprin, 80a, 84



## Maryland—Continued.

*Paleontology*—Continued.

Tropidoleptus fauna in the Chemung: Swartz, 10

Turritellidae, viviparous, Miocene: Burns, 99

Turtle, Miocene: Palmer (W), 09

Vertebrata, Miocene: Cope, 68h

*Petrology*.

Baltimore area: Williams (G H), 86, 92a

Basic rocks, northeastern Md.: Leonard, 01a

Cecil Co., crystalline rocks: Bascom, 02

Dikes, Baltimore: Williams (G H), 85c

Eruptives, acidic: Keyes, 95l

Gabbro, quartz-bearing: Grant (U S), 93d

Gabbros and hornblende rocks, Baltimore: Williams (G H), 84b

Granite: Keyes, 93d, 95i; Watson, 10a; Cecil Co.: Grimsley, 94

Granites, eruptive origin: Keyes, 93m

Granitic rocks: Williams (G H), 95

Ilchester, Howard Co.: Hobbs, 88a

Intrusive rocks, non-feldspathic: Williams (G H), 90f

Metamorphosed eruptives: Hobbs, 92b

Piedmont Plateau: Williams (G H), 91b

Quartz porphyry, Hollins Station: Williams (G H), 84c

South Mountain, volcanic rocks: Williams (G H), 92

Upper Cretaceous: Goldman, 16

*Physical geology*.

Anticlinal domes in the Piedmont: Mathews, 07

Blue Ridge: Keith, 92a

Faulting, Glen Echo: Gilbert, 05e

Piedmont Plateau: Mathews, 04; structure: Williams (G H), 91b

*Physiographic geology*.

Allegany Co.: Abbe, 00a

Anne Arundel Co.: Little, 17

Baltimore area: Darton, 92a

Calvert Co.: Shattuck, 07

Cecil Co.: Shattuck, 02

Choptank quadrangle: Miller (B L), 12

Cretaceous, Upper: Clark (W B), 16

Elk Garden coal field: Taff, 96a

Garrett Co.: Abbe, 02

General: Abbe, 99, 00; Clark (W B), 97b, 06c, 09, 18; Ducatel, 37a

Glaciation: Gibbs, 73

Pawpaw and Hancock quadrangles: Stose, 12b

Prince Georges Co.: Miller (B L), 11

St. Marys Co.: Shattuck, 07a

Terraces, Coastal Plain: Davis (W M), 07a; Cumberlandland: Abbe, 93

Tolchester quadrangle: Miller (B L), 17

*Underground water*.

Accident and Grantsville quadrangles: Martin (G C), 05f

Anne Arundel Co.: Little, 17

Frostburg and Flintstone quadrangles: Martin (G C), 05g

General: Clark (W B), 18a; Darton, 96d, 05f

Pawpaw and Hancock quadrangles: Stose, 05a

St. Marys quadrangle: Shattuck, 06a

Tolchester quadrangle: Miller (B L), 17

Water-bearing horizons: Darton, 95a

Marysville district, Mont.: Barrell, 07

Marysville folio, Cal. (no. 17): Lindgren, 95

Masontown-Uniontown folio, Pa. (no. 82): Campbell (M R), 02a

## Massachusetts.

Amherst region: Hitchcock (E), 63

Berkshire region: Cleland, 16a

Boston area: Shaler, 80c

Boulder, Lynn: Tracy, 69

Rockport: Saville, 90

Rockville, Essex Co.: Barden, 66

Cambrian fossils in Neocene gravels, Marthas Vineyard: Woodworth, 92

Catalog of rocks, minerals, and fossils: Hitchcock (E), 59a

Charles River estuary and Boston Harbor: Crosby, 03

Chester: Emmons (E), 24

Dendritic markings on slate, Newton: Teschemacher, 43b

Elizabeth Islands: Hitchcock (E), 24; Hollick, 01

Eozoon limestone: Burbank, 71; Perry, 71d

Essex Co., geological investigations: McDaniel, 84

Fossiliferous boulders, Cape Cod: Crosby, 79a

General: Hitchcock (C H), 71d; Hitchcock (E), 18; Hubbard (E), 11

Geological survey: Mass, H R, 37; Mass, St Bd Educ, 74, 75

Gloucester: Gregory (J J H), 64

Intercollegiate geological excursion: Hubbard (E), 11

Lowell: Street, 88

Lynn: Gregory (J J H), 64a

Lynnfield: Mudge, 62b

Manchester: Mudge, 62

Mansfield: Agassiz (L), 52c

Marble, flexible: Dewey, 25a; Meade (W), 14a

Marblehead: Gregory (J J H), 62

Marthas Vineyard: Hitchcock (E), 24; Gay Head: Baylies, 93; West (S), 93

Middleton: Gregory (J J H), 64b

Pebbles at Harwich (Cape Cod): Julien, 07c

Red marl, Springfield: Jackson, 51i

Salem: Hyatt, 69a

Singing beach, Manchester: Bolton, 83, 83a

Springfield: Orr, 01

Topsfield: Mackenzie, 64

Williamstown: Dewey, 19

*Economic geology*.

Berkshire Co.: Dewey, 29

Building stone: Shaler, 84a; Whittle, 98a Boston area: Crosby, 04c

Cement materials: Eckel, 13

Clay: Shaler, 96; Whittle, 98; Cape Cod: Fuller, 06g; Clinton: Alden, 10a

Coal, anthracite: Emmons (A B), 85; Holley, 77

Coal field, Bristol Co.: Hitchcock (E), 53a, b

Copper deposits: Weed, 11; Whately: Hitchcock (E), 44e

Davis pyrites mine: Rutledge, 06

Emery, Hampden Co.: Emerson, 98; Jackson, 65b; Shepard, 65; Smith (J L), 66

Essex Co.: Brockway, 75

Fuller's earth and brick clays near Clinton: Alden, 10a

General: Hitchcock (E), 32, 33, 38, 41



**Massachusetts—Continued.***Economic geology—Continued.*

Granites: Dale, 08a, 11; Quincy and Rockport: Wadsworth, 78a

Graphite, Worcester: Lyell, 44a

Hampshire Co.: Emerson, 98

Hematite, Berkshire: Eckel, 04i, 05c

Holyoke quadrangle: Emerson, 98a

Iron: Putnam, 86

Berkshire: Dana (J D), 86; Eckel, 04i, 05c; Hitchcock (E), 53a

Salisbury district: Hobbs, 07d

Kaolin, Blandford: Crosby, 90a

Lead: Hubbard (A O), 25

Hampshire Co.: Nash, 27

Newburyport: Richards (R H), 75

Northampton: Meade (W), 14b; Silliman, 14

Southampton: Hitchcock (E), 15

Lead-silver, Newburyport: Clapp (C II), 09a; Hovey (H C), 01

Limestone: Ries, 96

Limonite, Berkshire area: Dana (J D), 77b

Marble belt: Brainerd, 85; Seely, 85a

Northampton district: Richardson (C S), 53, 54, 54c, e

Road materials: Shaler, 95a; Whittle, 98a

Siderite, Gay Head: Blake (W P), 76

*Historical geology.*

Algonkian and Cambrian: Hobbs (W E), 99

Amherst region: Hitchcock (E), 63

Andover: Hitchcock (C H), 68

Archean and Cambrian, Green Mountains: Emerson, 95c

Berkshire area: Dana (J D), 77b, 86; Rogers (H D), 41a

Berkshire Co.: Dana (J D), 72g; Dewey, 29; Emerson, 99

Berkshires, geologic history of: Cleland, 06

Bernardston series: Emerson, 90

Bernardstown metamorphic rocks: Whitfield, 83a

Block Island: Woodworth, 97

Blue Hills area: Warren (C H), 13

Blue Hills complex: Barrell, 16b; Crosby, 98

Boston area: Dana (J F), 1<sup>c</sup>; Grabau, 98; Hunt, 71g; LaForge, 09; Shaler, 69b; Webster (J W), 24; postglacial history: Shimer, 15, 18

Boston Basin: Bouvé, 84; Crosby, 80c, 89; Tilton, 96b

argillite and conglomerate: Wadsworth, 83b

Blue Hills area: Crosby, 00

geologic history: Crosby, 90

Hingham: Crosby, 94

Nantasket and Cohasset: Crosby, 93

pinite, relation to felsite and conglomerate: Crosby, 89a

relations of conglomerate and slate: Crosby, 84b

southwestern part: Tilton, 95a

Boston Harbor: Crosby, 03b; islands: Crosby, 88

Braintree: Lea, 57b; Rogers (W B), 56c, 57a

Braintree argillites: Dodge (W W), 83; Marcou, 60; Wadsworth, 82

Cambrian, Boston Basin: Grabau, 00a

Bristol Co.: Shaler, 88a

North Attleboro: Gorham, 05

**Massachusetts—Continued.***Historical geology—Continued.*

Cape Ann: Shaler, 89b

Cape Cod area: Hollick, 02; Julien, 01a; Shaler, 98a; Upham, 79b

central: Julien, 00b

glacial geology: Allorge, 06; Fuller, 06g; Wilson (J H), 06

Carboniferous: Crosby, 80d

Brockton: Fuller, 96

Norfolk Co.: Woodworth, 94b

Chappaquidick Island: Hollick, 02

Charles River estuary: Crosby, 03b

Chester: Jackson, 65b

Clay slate, Connecticut Valley, age: Hitchcock (E), 52b

Clays, Boston Basin: Brown (R M), 02a

Coal beds, Worcester: Kemp, 87b

Coal field, Bristol Co.: Hitchcock (E), 53a

Coal Measures: Hitchcock (C H), 61c

Conglomerate, Bellingham: Crosby, 80b

Boston: Jackson, 35a

Harvard: Burbank, 76

Montague and Brighton: Niles, 71b

Connecticut Valley: Hitchcock (E), 23, 56b; Smith (A), 32

Deerfield: Sheldon, 03

Diamond Hill-Cumberland district: Warren (C H), 14

Diabase, distribution: Emerson (B K), 08

Eastern Mass.: Crosby, 80; Dodge (W W), 75, 82; Hunt, 71i

Elizabeth Islands: Hall, 78c; Hollick, 99h

Eozoonal limestones, eastern Mass.: Burbank, 72; Perry, 72

Eskers, Auburndale district: Davis (W M), 92b

Essex Co.: Hyatt, 71b; Packard (A S), 69a; Sears, 88, 90, 94b, 95, 05

Cambrian: Sears, 91a

Powow Hill: Gregory (J J H), 64c

southern part: Prescott, 39

Felsites, Boston: Diller, 81a

General: Crosby, 76; Emerson (B K), 17; Hitchcock (C H), 71d; Hitchcock (E), 32, 33, 41, 44; Honeyman, 89

Geologic map: Hitchcock (E), 32a, 44a; Hitchcock (C H), 71d

Granites: Emerson, 90a

Great Barrington: Julien, 87

Greenfield-Charlemont section: Hitchcock (C H), 58

Green Mountain region: Emerson, 92; Pumpelly, 94; age: Dana (J D), 80b

Greylock Range: Tenney, 74

Greylock synclorium: Dale, 91

Hampshire Co.: Emerson, 88, 98; Nash, 27

Hampshire, Franklin, and Hampden cos.: Emerson, 95b

Hawley sheet: Emerson, 92

Helderberg formation, Bernardstown: Dana (J D), 77c

Helderberg rocks, Connecticut Valley: Dana (J D), 73li

Hingham: Crosby, 92a

Holyoke quadrangle: Emerson, 98a

Holyoke range: Emerson, 86

Hoosac Mountain: Wolff, 94



**Massachusetts—Continued.***Historical geology—Continued.*

- Hoosac tunnel: Hall, 75d; Hitchcock (C H), 92b; Hunt, 75a
- Housatonic Valley: Hobbs, 93a
- Laurentian rocks, eastern Mass.: Hunt, 70a
- Limestones, age: Dana (J D), 91b
- Lowell: Silliman, 35
- Marthas Vineyard: Hall, 78c; Hollick, 93b, 94f; Shaler, 88; Woodworth, 97
- Cretaceous: Shaler, 89d
- Gay Head: Clark (W B), 90a; Uhler, 92 a, b, c; White (D), 90, 92
- Gay Head bluffs, age: Merrill (F J H), 90c; Ward (L F), 90a
- Medford dike area: Wilson (A W G), 01a
- Melaphyrs, Boston Basin: Crosby, 01b
- Milton, conglomerate: Wadsworth, 82
- Monument Mountain, Berkshire Co.: Dale, 94b
- Mount Greylock, Berkshire Co.: Dale, 87a, 94; geologic history: Dale, 06
- Mount Toby region: Walling, 79a
- Mount Washington, Taconic Range: Hobbs, 93
- Nahant: Lane, 89
- Nahant limestone: Foerste, 89
- Nantucket: Curtis, 99; Hollick, 96b; Shaler, 89c
- Sankaty Head: Desor, 49b; Merrill (F J H), 96; post-Pliocene: Scudder, 75b, 76d
- Narragansett Basin: Loughlin, 14b; Shaler, 99
- Nashua Valley: Burbank, 76a
- delta plains: Crosby, 03c
- geologic history: Crosby, 99a
- Neponset Valley, igneous rocks: Crosby, 05c
- Newbury: McDaniel, 84a
- Norfolk Co. Basin: Barton, 81
- Northampton district: Richardson (C S), 53
- Ordovician, Green Mountain region: Dana (J D), 73a
- Pebbles at Harwich, Cape Cod: Julien, 07c
- Permo-Carboniferous banded glacial slate, Squantum: Sayles, 16, 17a
- Plainville: Woodworth, 00
- Post-Pliocene, Chelsea: Stimpson, 51
- Potsdam fossiliferous pebbles in Carboniferous conglomerate: Rogers (W B), 61
- Quartzite, Green Mountains: Dana (J D), 72b
- Quincy granite: Loughlin, 11; Wadsworth, 82; relation to Braintree argillite: Wadsworth 82b
- Roxbury conglomerate: Burr, 00a; Mansfield, 06a; glacial origin: Sayles, 10
- Salem: Hyatt, 71a
- Silurian, Bernardston: Dale, 86
- Southampton: Eaton, 18a; Hitchcock (E), 15
- Squantum tillite: Sayles, 14
- Stamford gneiss: Snyder, 96
- Stoneham limestone: Wadsworth, 82
- Taconic area: Walcott, 88
- Taconic Range: Dana (J D), 84
- Taconic system: Emmons (E), 44; age and stratigraphy: Dana (J D), 73b, 79a, 82b, 84, 85b
- Tertiary, Marthas Vineyard: Lyell, 43a
- lower, Chappaquiddick Island: Brown (T C), 05
- Nantucket Island: Desor, 49
- Tertiary and Cretaceous: Shaler, 90b

**Massachusetts—Continued.***Historical geology—Continued.*

- Third cliff, pre-Pleistocene deposits: Bowman, 05
- Trap ridges, Connecticut Valley: Davis (W M), 83b
- Triassic, Connecticut Valley: Davis (W M), 83, 86a, d, 88, 91e; Emerson, 91, 96a; Hitchcock (E), 47a, 54, 58; Newberry, 88; Pynchon, 05; Redfield, 51; Russell, 78b; Whitney, 60b
- trap rocks: Davis (W M), 82b, 83, 89b; Emerson, 92a
- Turner's Falls region: Grabau, 98
- Wachusett dam region: Crosby, 99
- Western Mass.: Dewey, 20a, 24; Hobbs, 97
- Westfield: Davis (E), 26
- Weston aqueduct: Crosby, 04b
- Whately: Hitchcock (E), 44e
- Winthrop Head, Tertiary: Dodge (W W), 88
- Woonsocket basin: Schrader, 96
- Worcester area: Perry (J H), 03; phyllite, age: White (D), 12a

*Mineralogy.*

- Amherst region, catalog: Shepard, 76b
- Aragonite coating gravel pebbles: Lane, 12b
- Astrophyllite in granite of Quincy: Pirsson, 10
- Athol: Burbank, 75
- Babingtonite, Somerville and Athol: Palache, 02a
- Berkshire Co.: Emerson, 99; Silliman, 21
- Bolton: Dana (J D), 38
- Boltonite, Worcester Co.: Saemann, 50; Silliman (jr), 50b
- Boston area: Dana (J F), 18; Godon, 09a; Rand, 08; Wadsworth, 77
- Cerium ochre, Bolton: Jackson, 44a
- Chalcopyrite, Somerville: Richards (R W), 04
- Chester: Jackson, 66e, f; Palache, 09d
- Chialstolite, Lancaster: Jackson, 34
- Chlorophoeite: Hitchcock (E), 26
- Connecticut Valley: Hitchcock (E), 23
- Corundophyllite, Chester: Shepard, 68
- Corundum, Chester: Jackson, 66g
- Cryophyllite, Rockport: Cooke (J P), 67
- Cyanite: Vanuxem, 29
- Cymatolite, Goshen: Julien, 79b
- Cyrtolite, Rockport: Knowlton, 67
- Damourite, Sterling: Lewis (H C), 80c
- Danalite, Rockport: Cooke (J P), 66
- Datolite, Westfield: Kraus, 06b
- Deweylite: Shepard, 30a
- Emerald: Bruce, 14d
- Epidote, Huntington: Forbes, 96; Rowe: Dana (A G), 85
- Essex Co.: Sears, 94c, 05; southern part: Prescott, 39
- Fayalite, Rockport: Palache, 10b; Penfield, 96
- Feldspar, Bolton: Rath, 71, 72
- Franklin Co.: Emerson, 95
- Gahnite, Charlemont: Flint, 08; Rowe: Crosby, 88f; Dana (A G), 85
- General: Hitchcock (E), 25
- Gibbsite and alloplane, Richmond: Silliman (jr), 49
- Hampden Co.: Emerson, 95; Roe, 06
- Hampdenite: Roe, 06



## Massachusetts—Continued.

*Mineralogy*—Continued.

- Hampshire Co.: Emerson, 95; Nash, 27  
 Hampshireite: Roe, 06  
 Lynnfield: Chute, 56  
 Meteorite fraud in Norwood: Hovey, 10; Very, 10, 10a  
 Mica, Goshen: Mallet, 57  
 Microlite: Shepard, 42; Teschemacher, 42; Chesterfield: Hayes (A A), 44; Shepard, 35a  
 Mineral localities: Hitchcock (E), 28  
 Minerals, Pelham: Adams (J H), 70  
 Nahant: Emerson (G H), 64  
 Newbury: McDaniel, 84a  
 Newburyport: Swallow (E H), 75  
 Nuttallite, Bolton: Rath, 53  
 Octahedrite, brookite, and titanite, Somerville: Palache, 06  
 Olivine in serpentine of Chester and Middlefield: Palache, 07a  
 Orthite: Balch, 62  
 Parisite at Quincy: Palache, 11  
 Pegmatites of riebeckite-aegirite granite, Quincy: Warren (C H), 11a  
 Phenacite: Shepard, 38c; and zoisite: Palache, 07  
 Phosphate of iron, manganese and lithia, Norwich: Dana (J D), 51  
 Phosphate of uranium, Chesterfield: Teschemacher, 42a  
 Picrolite, Florida: Wadsworth, 80b  
 Pinite, eastern Mass.: Crosby, 80c  
 Pseudomorphs, limonite after diabantite: Emerson (B K), 16a  
 Quartz after prochlorite, Cranston and Worcester: Emerson (B K), 07a  
 Rockport: Cooke (J P), 67  
 Scapolite, Bolton: Jackson, 44a, c; Rath, 53a  
 Scheelite, Southampton: Shepard, 66  
 Sodalite, Essex Co.: Sears, 89; Balch, 64  
 Sodalite and elaeolite, Salem: Kimball, 60  
 Spodumene: Bowen (G T), 24a; Brush, 50; Hampshire Co.: Julien, 79  
 Tin, Goshen: Hitchcock (E), 29  
 Tin oxide, Chesterfield: Teschemacher, 43  
 Tourmaline, Chesterfield: Gibbs, 19  
 Tremolite, Newbury: Wadsworth, 78  
 Triphyline, Norwich: Brush, 62a  
 Triphylite, Norwich: Penfield, 79  
 Triplite, Norwich: Shepard, 52c  
 Vermiculite, Milbury: Jackson, 50a  
 Vesuvianite, Newbury: Crosby, 88c  
 Western Mass.: Dewey, 24  
 Westfield: Davis (E), 26  
 Worcester: Rand, 06  
 Yttrocerite, Worcester Co.: Jackson, 44b

*Paleontology*.

- Algonkian and Cambrian: Hobbs (W E), 99  
 Amber containing insects, Nantucket Island: Goldsmith, 79a  
 Anoplophora, Triassic: Emerson (B K), 00b  
 Bernardstown metamorphic rocks: Whitfield, 83a  
 Boston area: Grabau, 98; shells in drumlins: Upham, 94e  
 Braintree: Ordway, 61a

## Massachusetts—Continued.

*Paleontology*—Continued.

- Cambrian fauna: Burr, 00  
 Boston Basin: Grabau, 98b, 00a  
 Braintree: Shimer, 07a  
 Cohasset: Walcott, 92d  
 North Attleboro: Shaler, 88b  
 Trilobite: Shimer, 07  
 Cambridge slates: Woodworth, 93b  
 Carboniferous: Packard (A S), 98a  
 Brockton: Fuller, 96  
 Narragansett Basin: Packard (A S), 00  
 Norfolk Co.: Woodworth, 94b  
 Chappaquidick Island: Hollick, 02  
 Clathropteris, East Hampton: Hitchcock (E jr), 55, 61c  
 Coal field, Bristol Co.: Hitchcock (E), 53a  
 Coal plant, Worcester: Perry (J H), 85  
 Connecticut Valley: Hitchcock (E), 58; Rogers (H D), 65  
 Cretaceous flora: Hollick, 06; Pityoxyla: Jeffrey, 06  
 Diatoms: Edwards (A M), 60  
 Drumlins, Boston Basin: Crosby, 94a  
 Eozoon, Newberry: Bicknell, 69  
 Essex Co.: Sears, 05  
 Footprints, Connecticut Valley: Barratt, 45; Bouvé, 59a; Cushman, 04; Deane, 44, 44a, 45, 45a, 45b, 45c, 48, 49, 50, 61; Field, 60a; Hitchcock (E), 37, 44d, 45, 45b, 47, 48, 54, 56, 58, 63a, 65, 66a; Marsh (D), 48; Shepard, 67a; Warren (J C), 54; Woodworth, 00  
 General: Hitchcock (E), 41  
 Hampshire Co.: Emerson, 98  
 Ichnographs, Connecticut Valley: Deane, 61  
 Ichnology: Hitchcock (C H), 98  
 Man and mastodon, Worcester Co.: Putnam, 85  
 Markings, Turners Falls: Hitchcock (E), 57b  
 Marthas Vineyard, Cretaceous: Shaler, 89d; plants, Hollick, 95d; White (D), 90  
 Gay Head, Crabs: Cushman, 05; Packard, 00a; Stimpson, 63  
 Graphiodon: Leidy, 70r  
 horse: Woodworth, 00a  
 Miocene barnacles: Cushman, 04c  
 Prepinus: Jeffrey, 10a  
 Tertiary: Dall, 94a; Lyell, 43a  
 Mastodon, Colerain: Hitchcock (E), 72; Worcester Co.: Rice (F P), 85  
 Mollusca, recent, Fort Warren: Niles, 69, Easthampton: Hitchcock (E jr), 56  
 Nantucket Island: Shaler, 89c  
 Pleistocene fauna: Cushman, 04b, 05a, 06; Desor, 48b  
 post-Pliocene: Scudder, 76d; Verrill, 75  
 Sankaty Head, Pleistocene: Wilson (J H), 05  
 Ornithichnites: Deane, 43; Field, 60; Hitchcock (E), 36; Mantell, 46; Rogers (H D), 41b  
 Otozoum, Connecticut Valley: Hitchcock (E), 56c  
 Paradoxides, Braintree: Jackson, 59g; Rogers (W B), 56c, d, e  
 Paradoxides harlani, Braintree: Ordway, 61  
 Paradoxides haywardi, Braintree: Raymond (P E), 14  
 Plants, new red sandstone: Hitchcock (E), 43c; Worcester: Kemp, 87b



## Massachusetts—Continued.

*Paleontology*—Continued.

- Pleistocene, Winthrop: Dodge (R E), 94b  
 Pleistocene beetles, Fort River: Scudder, 98  
 Podokesaurus, Triassic, Connecticut Valley: Talbot, 11  
 Post-Pliocene, Chelsea: Stimpson, 51  
 Quaternary, Boston region: Upham, 92  
 Roxbury conglomerate: Burr, 00a  
 Stegomus, Triassic, Connecticut Valley: Emerson (B K), 04b  
 Taconic fossils: Dana (J D), 86a  
 Tarsodactylus, Triassic: Hitchcock (C H), 66  
 Tertiary, Chappaquiddick Island: Brown (T C), 05; Marshfield: Jackson, 50f  
 Trails, Crustacea: Packard, 00b  
 Triassic, Connecticut Valley: Lull, 15  
 Triassic fishes and plants: Newberry, 88  
 Trilobita, Cambrian: Barrande, 60; Jackson, 56i, j; Rogers (W B), 57a; Walcott, 84  
 Unios, Triassic: Troxell, 14  
 Vitrinella, Boston: Clapp (W F), 14  
 Winthrop Head, Tertiary: Dodge (W W), 88

*Petrology*.

- Alkali granites and porphyries of Quincy and the Blue Hills: Warren (C H), 13  
 Alkali syenite, Beverley: Wright (F E), 00  
 Amygdaloidal melaphyr, Brighton: Benton, 80  
 Berkshire Co.: Emerson, 99  
 Boston area: Dana (J F), 18; Godon, 09a; Grabau, 98; Wadsworth, 77; White (T G), 97  
 Blue Hills area: Crosby, 00  
 diabase dike: Hobbs, 88  
 Hingham: Crosby, 94  
 Nantasket and Cohasset: Crosby, 93  
 pinite, relation to felsite and conglomerate: Crosby, 89a  
 Brighton amygdaloids, Boston: Shaler, 79a; banded amygdules: Davis (W M), 80  
 Cape Ann: Shaler, 89b  
 Conglomerate schist, western Mass.: Wolff, 91  
 Deerfield dike: Emerson (B K), 82b  
 Diabase cylinders, Holyoke: Emerson (B K), 16  
 Diabase pitchstone and mud inclosures in Triassic trap: Emerson (B K), 97  
 Diamond Hill-Cumberland district: Warren (C H), 14  
 Dike, biotite tinguaitite, Essex Co.: Eakle, 98b  
 Dikes, Manchester: Pearce, 95  
 Dunite, Cheshire: Martin (G C), 98  
 Essex Co.: Sears, 89, 91, 93, 93a, 94b, 95, 05; Washington, 98, 98c; southern part: Prescott, 39  
 Felsites, Boston region: Diller, 80, 81  
 General: Emerson (B K), 17  
 Granites: Emerson (B K), 00a  
 Greylock: Dale, 94  
 Hampshire Co.: Emerson (B K), 98  
 Holyoke Range: Emerson (B K), 04a  
 Holyokeite from Triassic: Emerson (B K), 02b  
 Hoosac Mountain: Wolff, 94  
 Igneous rocks, Essex Co.: Clapp (C H), 10a; Pigeon Cove: Keeley, 14  
 Kaolin, Blandford: Crosby, 90a  
 Keratophyre, Marblehead Neck: Sears, 90a  
 Manchester, biotite tinguaitite: Sears, 98  
 Marblehead: Wadsworth, 82d

## Massachusetts—Continued.

*Petrology*—Continued.

- Medford dike area: Lane, 06a; Wilson (A W G), 01a  
 Melaphyre, Brookline, Newton, and Brighton: Burr, 01  
 Nantasket area: Merrill (G P), 93a  
 Neponset Valley volcanics: Bascom, 00, 12; Crosby, 05c  
 Northfieldite, pegmatite, and pegmatitic schist: Emerson (B K), 15  
 Pegmatite, acid, in diabase, Medford: Jaggar, 98  
 Pegmatites of riebeckite-ægirite granite at Quincy: Warren (C H), 09, 11a  
 Plumose diabase, Holyoke trap sheet: Emerson (B K), 05  
 Porphyries, Marblehead: Hyatt, 76  
 Quincy, Houghs Neck dike: Wolff, 84  
 Quincy and Rockport: Wadsworth, 78a  
 Slate, Somerville: Mills (J E), 57  
 Sölvbergite, Essex Co.: Washington, 98b  
 Syenite, Nahant: Jackson, 52b; South Danvers: Nichols (A), 56  
 Syenite and gabbro, Essex Co.: Wadsworth, 85b  
 Tinguaitite, Essex Co.: Washington, 98b  
 Trachyte, Marblehead Neck: Wadsworth, 82e  
 Trap rocks, Connecticut Valley: Dana (E S), 74  
 Wachusett dam region: Crosby, 99  
 Weston Aqueduct: Warren (C H), 04  
 Worcester area: Perry (J H), 03  
 Zircon syenite, Salem: Wadsworth, 82f
- Physical geology.*  
 Berkshire Co.: Emerson (B K), 99  
 Boulders, formed in situ: Barton, 92; striated, Amherst: Hitchcock (E), 56a  
 Cape Cod beach, erosion by flying sand: Julien, 02  
 Changes of level, Cape Ann: Tarr, 03; Essex Co.: Sears, 94, 08  
 Cirques and rock-cut terraces, Mount Toby: Emerson (B K), 11  
 Clay concretions, Connecticut River: Arms, 91  
 Coastal marshes south of Cape Cod: Davis (C A), 12  
 Coastal subsidence: Townsend, 11; botanical evidence: Johnson (D W), 11a  
 Compression in rocks, Boston Basin: Crosby, 80a  
 Concretions, Champlain clays: Sheldon, 00  
 Conglomerate, altered, Hingham: Bouvé, 62  
 Connecticut Valley, trap and sandstone, relations: Stodder, 57; Whelpley, 45a  
 Contorted strata in drift: Desor, 52h  
 Decayed gneiss, Hoosac Mountain: Hunt, 75b  
 Deformed pebbles: Rogers (W B), 75  
 Diabase, disintegration, Medford: Merrill (G P), 96b  
 Dikes, Manchester: Pearce, 95  
 Distorted pebbles, Boston Basin: Crosby, 80a, b  
 Dodecahedral jointing: Lahee, 10  
 Drift-filled cracks in clay, East Boston: Stodder, 53  
 Faceted pebbles, Cape Cod: Davis (W M), 94b  
 Fault in an esker: Lahee, 08b  
 Faults and joints, Governor's Island, Boston Harbor: Rogers (W B), 57d



## Massachusetts—Continued.

*Physical geology*—Continued.

- Fissures in pudding stone, Roxbury: Jackson, 49c  
 General: Hitchcock (E), 35  
 Glacial striae, deflected, Somerville: Upham, 93g  
 Green Mountains: Whittle, 94a  
 Greylock synclorium: Dale, 91  
 Hard-packed sand and gravel, Nashua Valley: Crosby, 02b  
 Harvard seismographic station, reports: Woodworth, 12a  
 Hoosac tunnel, decayed rock: Hunt, 75c  
 Housatonic Valley: Hobbs, 93a  
 Joints, Mystic River: Woodworth, 96a  
 Kettle holes, Woods Hole: Koons, 84  
 Landslides, Mount Greylock and Briggsville: Cleland, 02  
 Landslips in basin of Lake Bascom: Taylor (F B), 16  
 Marblehead, raised beach: Hyatt, 70  
 Metamorphosed pebbles in conglomerate rocks: Niles, 72a  
 Monument Mountain, Berkshire Co.: Dale, 94b  
 Mount Washington, Taconic Range: Hobbs, 93  
 Nantucket, shore line changes: Barnard, 99  
 Newport conglomerate: Rogers (W B), 75  
 Potholes, Pearl Hill: Hartwell, 92; Shelburne Falls: Crosby, 87a  
 Rain marks, Triassic: Redfield, 51a  
 Rensselaer grit plateau: Dale, 93  
 Ripple marks, Brookline: Cabot, 50  
 Roxbury conglomerate, cementing material: Hayes, 57a  
 Salt marsh formation near Boston: Davis (C A), 10a  
 Shore line changes, Winthrop: Roorbach, 10; Scituate - Marshfield region: Johnson (D W), 11a  
 Somerville, veins: Earle, 99  
 Structural features, western Mass.: Hobbs, 03a  
 Subsidence of Boston Harbor: Freeman, 03  
 Subsidence, supposed, of coast: Johnson (D W), 10b  
 Sutton, "Purgatory" chasm: Crosby, 84  
 Trap dikes, Cohasset: Jackson, 56e  
*Physiographic geology.*  
 Beaches, elevated, Cape Ann: Woodworth, 03b  
 Berkshire Co., recessional ice borders: Taylor (F B), 03  
 Boston area: Curtis, 00; Grabau, 98  
 Boston Basin: Crosby, 89  
   Blue Hills area: Crosby, 00  
   Hingham: Crosby, 94  
   Nantasket and Cohasset: Crosby, 93  
   physical history: Crosby, 89  
 Boston Bay: Shaler, 75f  
 Boulder train, eastern Mass.: Fuller, 98  
 Boulders: N., 25  
   between Salem and Danvers: Pickering, 54  
   Groveland: Mudge, 62c  
 Brewsters Neck a glacial deposit: Gulliver, 06  
 Buried river channels: Kemp, 15b  
 Cape Cod: Upham, 79b  
   outline: Davis (W M), 96b  
   physiographic features: Allorge, 06

## Massachusetts—Continued.

*Physiographic geology*—Continued.

- Cape Cod district: Grabau, 99b; Shaler, 98a  
 Charles River, geologic history: Clapp (F G), 01  
 Coast: Shaler, 75  
 Connecticut Lake, north of Holyoke: Emerson (B K), 87  
 Connecticut Valley, glacial retreat: Dana (J D), 82; terraces: Hitchcock (E), 50  
 Contoured map: Davis (W M), 89h  
 Cuttyhunk Island: Gulliver, 03  
 Delta plain, Andover: Mills (F S), 03  
 Drift, Boston: Stodder, 46; origin: Desor, 51b  
   Cambridge: Agassiz (L), 50b  
   Middlesex Co.: Barton, 89  
   Salem: Pickering 71  
 Drumlins: Davis (W M), 84c; Hitchcock (C H), 77b  
   Boston Harbor: Curtis, 10  
   Boston region: Upham, 93e  
 Eastern Mass., surface geology: Crosby, 77  
 Eskers: Woodworth, 94c  
 Essex Co.: Sears, 05; preglacial sand plain: Sears, 94a  
 General: Davis (W M), 97; Hitchcock (E), 41; Keith, 16; Niles, 71, 75  
 Glacial deposits, Gloucester: Shaler, 66d  
 Glacial geology, Nantucket and Cape Cod: Wilson (J H), 06  
 Glacial history, New England islands: Upham, 99e  
 Glacial lakes, Boston Basin: Grabau, 96  
 Glacial period, complexity in northeastern New England: Clapp (F G), 08  
 Glacial striae, Brookline: Cabot, 48; Desor, 48a  
   Roxbury: Jackson, 48a  
   Somerville: Upham, 93g  
 Glacial stages: Clapp (F G), 06a; Fuller 06g, h; Wilson (J H), 06  
 Glaciation: Hitchcock (E), 57  
   Berkshire Hills: Taylor (F B), 03a  
   Boston area: Upham, 79a  
   Hingham: Bouvé, 91  
   Green Mountains: Hitchcock (C H), 60a  
   Marthas Vineyard: Bryson, 93; Uhler, 92b; Woodworth, 00a  
   Paleozoic, Boston Basin: Lahee, 14  
 Gravel deposits, Charles River basin: Clapp, 04  
 Gravel ridges, Merrimac Valley: Wright (G F), 77  
 Gulf of Maine: Lindenkohl, 83  
 Hampshire Co.: Emerson (B K), 88  
 Ice retreat in glacial Lake Neponset: Fuller, 04e  
 Kettle holes, Woods Hole: Koons, 85  
 Lake Bouvé: Grabau, 00  
 Lake Sudbury sand plains: Goldthwait, 05  
 Lakes enclosed by modified drift: Upham, 91f  
 Lynn, salt marshes: Mudge, 62a  
 Medford dike area: Wilson (A W G), 01a  
 Moraine, central Mass.: Tarr, 92d  
   Charles River valley: Shaler, 70b  
   Newington: Katz, 17  
   terminal: Upham, 79  
 Mount Toby: Emerson (B K), 03



## Massachusetts—Continued.

*Physiographic geology*—Continued.

- Nantasket beach: Johnson (D W), 10d; Reed (W G), 08
- Nantucket: Curtis, 99; Wilson (J H), 06
- Haulover Beach: Scudder, 80b
- Pleistocene deposits, Sankoty Head: Cushman, 06; Wilson (J H), 05, 07
- shore lines: Gulliver, 04, 09
- Wauwinet-Coscata tombolo: Gulliver, 10a
- Nantucket Sound: Gulliver, 05
- Nashua Valley: Crosby, 03c
- geologic history: Crosby, 99a
- glacial lake: Crosby, 99c
- Newtonville sand plain: Gulliver, 93
- Parallel ridges of glacial drift: Shaler, 70
- Pleistocene, central Mass.: Alden, 08
- Postglacial Connecticut, Turner's Falls: Jefferson, 98a
- Pre-Wisconsin glacial drift, Boston Basin: Wentworth, 15
- Pre-Wisconsin till: Fuller, 01
- Richmond boulder trains: Agassiz (L), 72a, Benton, 78; Desor, 47c; Hitchcock (E), 44c, 45a; Lyell, 55a; Perry, 71b; Reid (S), 45; Rogers (H D), 45a, 46a; Taylor (F B), 10b
- Sand plains, Cape Cod region: Grabau, 97
- Shells in till near Boston: Upham, 89a
- Shore line changes, Winthrop area: Roorbach, 10
- Sudbury Basin shore lines: Gulliver, 05a
- Taconic physiography: Dale, 05a
- Terraces: Davis (W M), 02; Westfield River: Davis (W M), 02a
- Third Cliff glacial deposits: Bowman (I), 06
- Tills, eastern Mass.: Fuller, 01a
- Trap ridges, Connecticut Valley: Davis (W M), 83b
- Wash plains: Woodworth, 98
- Western Mass.: Dixon, 97
- Westfield in Champlain period: Diller, 77
- Worcester: Perry (J H), 98
- Underground water.*
- Artesian well, Boston: Hunt, 75d
- Boston: Hayes (A A), 55
- Connecticut Valley, Triassic area: Fuller, 05b; Pynchon, 05
- Eastern Mass.: Crosby, 05a; saline matter: Hayes (A A), 56b
- General: Crosby, 04, 05; Shaler, 97
- Taconic quadrangle: Taylor (F B), 05
- Well waters in the granites: Clapp (F G), 11a
- Massanutten Mountain, Va.: Spencer (A C), 95
- Matachewan gold area, Ont.: Burrows (A G), 18
- Matanuska basin, Alaska: Paige, 07a, b
- Matanuska coal field, Alaska: Griffith, 06a; Martin (G C), 06a, b, 11, 12b
- Matanuska Valley, lower, Alaska: Martin (G C), 12b
- Matawan formation: Berry, 03; Clark (W B), 04b; Knapp (G N), 04a
- Mather, W. W., biography: Hitchcock (C H), 97
- Mattagami Valley, Ont.: Kerr, 06
- Mathevia: Walcott, 85b
- Mauch Chunk shale: Barrell, 07a; Stevenson, 02
- Maui: Dana (J D), 89a
- Mauna Loa. *See* Hawaii.
- Maxville limestone: Andrews (E B), 71c; Morse, 10; fauna: Morse, 11
- Maynardville folio, Tenn. (no. 75): Keith, 01
- Meander belts, limiting width: Jefferson, 02
- Meandering.
- Development of cut-off meanders: Tower, 04
- Development of river meanders: Davis (W M), 03c
- General: Davis (W M), 14a; Fenneman, 09; Purdue, 14e
- Indiana, Muscatatuck, Vernon: Dryer, 99a
- Meanders and scallops: Jefferson, 10a
- Meanders on the Rouge, Mich.: Davis (D H), 08
- Missouri River shifting: Duncanson, 09
- Mechanics of Allegheny structure: Ashley, 08
- Mechanics of vein formation: Taber (S), 18a
- Medina formation: Schuchert, 14a
- Medina sandstone: Grabau, 07g; Kindle, 14f; beach structure in: Fairchild, 01b
- Medusae. *See* Hydrozoa.
- Meek, F. B., biography: White (C A), 77f, 96, 02a
- Meerschaum, New Mexico: Bush, 15c; Michel, 4, Sterrett, 08b
- Meetings. *See* Associations.
- Megacerops: Lull, 05
- Megalneusaurus, Jurassic, Wyoming: Knight (W C), 98
- Megalonyx: Harlan, 31; Hovey (H C), 91b; Leidy, 57i
- Tennessee: Claypole, 97a
- Virginia: Jefferson, 99
- Megalonyx jeffersoni, Ohio: Orton, 91a
- Megalosaurus: Hay (O P), 09; Leidy, 68f
- Meganos group, Eocene, California: Clark (B L), 18
- Megatherium, Franklin Co., Ind.: Haymond, 44
- Megatherium americanum: Owen (R), 60
- Meguma series, Nova Scotia: Woodman, 04a
- Melonites: Jackson, 96, 96a
- Menifee gas field, Ky.: Munn, 13
- Menominee district, Mich.: Bayley, 04; Van Hise, 01
- Menominee folio, Mich. (no. 62): Van Hise, 00
- Mentor beds, Comanche series: Cragin, 95a
- Mercer group, age: White (D), 03d
- Mercer limestone: Mark, 11
- Mercersburg-Chambersburg folio, Pa. (no. 170): Stose, 09
- Mercur mining district, Utah: Spurr, 95
- Mercury. *See* Quicksilver.
- Mercury minerals from Terlingua, Tex.: Hillebrand, 09
- Merostomata, Cambrian: Walcott, 10
- Merycochoerus, Montana: Douglass, 00
- Merycodus, Miocene, Colo.: Matthew (W D), 04
- Merycoidodon: Gilmore, 06b; Leidy, 48
- Merycoidodonts: Douglass, 06, 07-07b
- Mesabi district, Minn.: Leith, 03; Van Hise, 01
- Mesabi Range iron ores: Meeks, 07
- Mesa Verde, Colo.: Atwood, 11b
- Mescal Canyon coal field, N. Mex.: Keyes, 07f
- Meshippus: Scott (W B), 91c
- Mesolite, Minnesota: Winchell (N H), 98d
- Mesonacis: Walcott, 85a



**Mesozoic (undifferentiated).**

- Alaska, Broad Pass region: Moffit, 15  
 Chisana-White River district: Capps, 16  
 Fort Hamlin to Kotzebue Sound: Mendenhall, 02  
 international boundary: Cairnes, 14  
 Ketchikan district: Wright (C W), 15  
 Lake Clark-central Kuskukwim region: Smith (P S), 17  
 northern: Schrader, 04  
 Yukon-Koyukuk region: Eakin, 14b, 16  
 Arctic regions: McMillan, 10  
 Ellesmere Land: Hottedahl, 17  
 Arizona, Bisbee quadrangle: Ransome, 04  
 Santa Rita and Patagonia Mountains: Schrader, 15  
 British Columbia, Beaverdell area: Reinecke, 15  
 California, Sierra Nevada: Mills (J E), 92  
 Castile gypsum and Rustler formation, age: Udden, 15b  
 Franciscan sandstone: Davis (E F), 18  
 General: Agassiz (L), 63g; Cook (G H), 88; White (C A), 89b  
 Greenland, eastern: Toula, 74  
 Guatemala, Alta Vera Paz: Sapper, 01a  
 Mexico: Bárcena, 75b  
 Middle Atlantic States: Martin (D S), 74a  
 New Mexico: Cope, 77  
 North Carolina, eastern: Rogers (W B), 54  
 Oregon, Cascades: Smith (W D), 17  
 Virginia, eastern: Rogers (W B), 54, 55b  
 Yukon, international boundary: Cairnes, 14  
 White River district: Cairnes, 14d, 15  
 Metaline district, Wash.: Bancroft (H), 11a  
 Metallic elements, relative abundance: Clarke (F W), 14b  
 Metallic wealth of the United States: Whitney, 54  
 Metalliferous ores, geographic distribution: Ransome, 04d  
 Metallogenetic epochs: Lindgren, 09c; in pre-Cambrian of Ontario: Miller (W G), 15  
 Metalophodon, dentition: Cope, 73w  
**Metamorphism.**  
 Alaska, southeastern: Wright (F E), 08f  
 Alteration of rocks: Hunt, 75e  
 Anamorphism: Leith, 15a  
 Appalachians, southern: Graton, 06a  
 Arizona, Silverbell district: Stewart (C A), 12  
 Warren district: Bonillas, 16  
 Yuma Co.: Bancroft (H), 11  
 Atlantic States: Rogers (H D), 57  
 British Columbia, Golden-Kamloops: Daly (R A), 15  
 granite altered to garnet: Brock, 15a  
 Shuswap lakes region: Daly (R A), 12  
 Vancouver area: Burwash, 18  
 Burning of lignite in situ: White (C A), 83o  
 Burning shale near Los Angeles, Cal.: Arnold, 08i  
 California, coast ranges: Becker, 86a  
 Eagle Mountains: Harder, 12  
 Nevada City and Grass Valley districts: Lindgren, 96b  
 Shasta Co.: Graton, 10  
 Cause: Rogers (H D), 48a; Hixon, 11  
 Chemical composition as a criterion in identifying metamorphosed sediments: Bastin, 09

**Metamorphism—Continued.**

- Classification of metamorphic rocks: Miller (W J), 17b  
 Coal: White (D), 13d  
 Colorado, southern: Stevenson, 75  
 Combustion of hydrocarbons: Arnold, 07g  
 Conglomerate: Jackson, 62b; altered, Hingham, Mass.: Bouvé, 62  
 Conglomerate schist, western Mass.: Wolf, 91  
 Connecticut: Barrell, 10  
 Contact metamorphism, Palisades diabase: Irving, 98  
 relation to ore deposits: Park, 06  
 Robinson mining district, Nev.: Lawson, 06  
 Convergence to mineral type in dynamic metamorphism: Leith, 15a  
 Crystalloblastic order: Lahee, 14a  
 Definition: Daly (R A), 17  
 General: Bastin, 13; Clarke (F W), 08; Comstock, 86b; Daly (R A), 17; Dana (J D), 43, 474, 3e, 74, 75f, 86d; Daubrée, 59; Frazer, 76d; Genth, 74a; Grabau, 13; Grimsley, 97b; Henrich, 88a; Hunt, 54c, 57e, 62c, 63b, 74k; Jackson, 48, 59b, d; King (W), 81; Lawson, 89; Lieber, 59e, 60; Lyell, 44a; Steidtmann, 11; Stevenson, 85b; Tschermacher, 48a; Van Hise, 98a, 04; Virlet d'Aoust, 58; Weed, 03e; Williams (G H), 90e; Winchell (A), 89c; Wurtz, 73; Anon, 99  
 Glauconite-bearing rocks in California: Smith (J P), 06  
 Glacial deposits: Carney, 09  
 Green Mountains: Whittle, 93  
 Grenville limestone: Julien, 13  
 Hornblende gabbro, zonal weathering: Brokaw, 16a  
 Huronian: Irving, 84b  
 Hydrothermal alteration: Uglow, 13b; of granite; Moore (E S), 12a, 14c  
 Igneous: Beck, 43b, 44  
 Kansas, Silver City area: Twenhofel, 17  
 Lake Superior eruptive rocks: Williams (G H), 88f  
 Laurentian limestones, Canada: Winchell (N H), 03d  
 Limestone blocks in tuff of Mont Pelé: Dubancq-Laborde, 12  
 Limestone, crystalline: Hunt, 54b  
 Maryland, metamorphosed eruptives: Hobbs, 92b; Piedmont Plateau: Mathews, 04  
 Massachusetts, Berkshire: Hobbs, 93b  
 Metamorphic cycle: Leith, 07b  
 Metamorphic products from burning of coal beds: Allen (J A), 74  
 Metamorphic rocks, mineralogy: Hunt, 57c  
 Metamorphic studies: Leith, 12a  
 Metamorphosed ore deposits: Emmons (W H), 09  
 Metamorphosis without crushing: Emerson, (B K) 02  
 Mexico, San Luis Potosi, Dolores deposit: Spurr, 12a  
 Sonora, Elisa mine: Lee (M L), 12  
 Velardeña district: Spurr, 08a  
 Michigan, Marquette region: Williams (G H), 90  
 Menominee region: Williams (G H), 90



## Metamorphism—Continued.

- Migration of material: Harker, 93  
 Montana, Butte district: Weed, 12  
   Elkhorn district, Jefferson Co.: Weed, 01  
   Marysville district: Barrell, 07  
   Philipsburg quadrangle: Emmons (W H), 13b  
 Nevada, Ely district: Spencer (A C), 17  
   Reese River basin: Waring (G A), 18  
   Yerington district: Knopf, 18a  
 New form: Keith, 16a  
 Newfoundland, Conception Bay: Buddington, 16  
 New Hampshire, Pequawket Mountain: Jackson, 43b  
 New York, Adirondacks: Kemp, 96c  
   graphite deposits: Bastin, 10a  
   Cortlandt series: Rogers (G S), 11a  
   Manhattan Island: Julien, 03  
   New York Island: Berkey, 15  
   St. Lawrence Co.: Smyth (C H), 96  
   Westchester Co.: Callaway, 87; Dana (J D), 80e; Harker, 87  
 North Carolina, dunitite beds: Julien, 83a  
 Nova Scotia: Bailey (L W), 96b; Honeyman, 73a  
   auriferous beds: Prest, 95  
   Halifax, contact metamorphism: McIntosh, 15  
   Halifax Co., Moose River gold district: Woodman, 05  
   Shelburne Co.: Powers, 15a  
 Ontario, Laurentian limestones: Graton, 03a  
   Rideau Lake: Willecox, 93  
 Palisades diabase: Irving, 98  
 Pennsylvania, Newark group: Wherry, 10  
   New Hope: Rogers (H D), 48  
 Phases and definitions: Daly (R A), 17  
 Pre-Cambrian, Ontario: Coleman, 12a  
 Pre-Cambrian schists: Adams (F D), 12a  
 Principles underlying metamorphic processes: Johnston (J), 13b  
 Pseudo-diorite: Keith, 13a  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 Rhode Island: Dale, 85a; Hawkins, 18  
   Cumberland gabbro: Warren, 08a  
   Narragansett Basin: Lahee, 12a  
 Rock pressure and metamorphism: Chance, 08c  
 Secondary silicate zones: Higgins, 14; Uglow, 14  
 Sedimentary rocks: Hunt, 57i, n  
 Silicate zones at contacts: Uglow, 13a  
 Siliceous sandstone: Merrill (G P), 07c  
 South Carolina: Lieber, 60  
 Spontaneous combustion of coal: Lakes, 07  
 Superficial alteration of ore deposits: Penrose, 94  
 Thermometamorphism, igneous rocks: Harker, 92a  
 Trinidad: Craig, 07b  
 Utah, Park City district: Boutwell, 12  
   San Francisco district: Butler (B S), 13, 14a  
   Tintic district: Tower, 99  
 Virginia, James River basin: Taber (S), 13  
   Prince William Co.: Rogers (W B), 55c

## Metamorphism—Continued.

- Volcanic tuffs: Pirsson, 15a  
 Volume changes in metamorphism: Lindgren, 18b  
 Washington, Cascades, Tertiary granite: Smith (G O), 00b  
 Metasomatism.  
   Copper-bearing rocks, Lake Superior: Pumphelly, 78  
   Downward sulphide enrichment: Bastin, 13  
   General: Lindgren, 01a  
 Meteor Crater. *See* Arizona, *physiographic*.  
 Meteorites.  
   Abert: Clarke (F W), 87; Riggs (R B), 87, 87a  
   Absence in sedimentary strata: Jackson, 67a  
   Admire, Lyon Co., Kans.: Merrill (G P), 02, 02c  
   Ahumada, Chihuahua, Mex.: Farrington, 14  
   Ainsworth, Nebr.: Howell, 08, 08b; Tassin, 03  
   Alabama: Jackson, 45b  
   Albuquerque, N. Mex.: Eakins, 86  
   Alexander Co., N. C.: Bailey (S C H), 91  
   Algoma, Wis.: Hobbs, 02d, 03  
   Allegan, Mich.: Merrill (G P), 99a, 00; Ward (H L), 99a; oldhamite in: Tassin, 03a  
   Allen Co., Ky.: Whitfield (J E), 87  
   Amana, Iowa: Hinrichs, 05; Leonard, 75; Prior, 18  
   Analyses of iron meteorites classified: Farrington, 07  
   Analyses of stone meteorites: Farrington, 11  
   Andover, Maine: Kunz, 98; Ward (H A), 02a, 03a  
   Aragonite: Smith (J L), 76a  
   Arispe, Ariz.: Farrington, 14  
   Arispe, Mex.: Ward (H A), 02a; Wuensch, 03  
   Arizona, abundance on Painted Desert: Keyes, 10j  
   Coon Butte: Barringer, 06, 06a, 10; Farrington, 06b; Mallet, 06; Tilghman, 06  
   Arlington, Minn.: Winchell (N H), 96b  
   Ashville, N. C.: Shepard, 39  
   Atemajac, Jalisco, Mexico: Landero, 97  
   Auburn, Ala.: Shepard, 69  
   Augusta Co., Va.: Campbell (H D), 03; Kunz, 86f, 87a; Mallet, 71, 78a  
   Babbs Mill, Tenn.: Cohen, 91, 92  
   Bacubirito, Sinaloa, Mex.: Angermann, 04b; Ward (H A), 02  
   Bald Eagle, Pa.: Ward (H A), 02a  
   Bath, S. Dak.: Foote (A E), 93  
   Bath Furnace, Ky.: Miller (A M), 03, 03a, 03b; Ward (H A), 03, 05a  
   Bear Creek, Colo.: Smith (J L), 67  
   Bear River, Colo.: Jackson, 61  
   Beaver Creek, B. C.: Howell (E E), 93b, 94  
   Bethlehem, N. Y.: Shepard, 60; Wells, 60  
   Billings, Mo.: Ward (H A), 05  
   Bishop Canyon, Colo.: Farrington, 14  
   Bishopville, S. C.: Smith (J L), 64; Wadsworth, 83  
   Bluff, Tex.: Charlton, 01  
   Bolson de Mapimi, Mex.: Brezina, 81  
   Bonanza (=Santa Rosa), N. Mex.: Shepard, 67b  
   Botetourt Co., Va.: Cohen, 92; Shepard, 66b  
   Brazos River, Tex.: Shumard (B F), 60b



**Meteorites—Continued.**

- Brenham, Kiowa Co., Kans.: Hay (R), 93d;  
Kunz, 90, 90a, g; Snow, 90b; Winchell  
(N H), 90a
- Bridgewater, Burke Co., N. C.: Kunz, 90,  
90b, h
- Burlington, N. Y.: Silliman (jr), 44a
- Butcher, Coahuila, Mex.: Smith (J L), 81a
- Butler, Mo.: Broadhead, 75c; Smith (J L), 77
- Cabarras Co., N. C.: Shepard, 50
- Cabin Creek, Johnson Co., Ark.: Kunz, 87c, i;  
Whitfield (J E), 87
- Cacaria, Mex.: Cohen, 92
- Calcium phosphate in meteoric stones: Merrill  
(G P), 17a
- Cambria, N. Y.: Silliman (jr), 45, 46
- Campbell Co., Tenn.: Smith (J L), 55
- Canoncito, Santa Fe Co., N. Mex.: Kunz, 85b
- Canyon Diablo, Ariz.: Barringer, 15; Cohen,  
92; Derby, 95; Foote (A E), 91, 92b;  
Keyes, 13m; Kunz, 93; Merrill (G P),  
07d, 08; Tassin, 06; Meunier, 16; Moissan,  
04a
- Canyon City, Trinity Co., Cal.: Shepard, 85;  
Ward (H A), 04
- Cape Girardeau, Mo.: Dana (J D), 86c
- Cape York, Greenland: Hovey, 05h; Peary, 94,  
98
- Carbon compounds: Smith (J L), 76, 76e
- Carlton, Hamilton Co., Tex.: Howell (E E),  
90, 90a
- Carroll Co., Ky.: Kunz, 87b, f
- Carthage, Smith Co., Tenn.: Kaemmerer, 13,  
13a; Troost, 46
- Casas Grandes, Chihuahua, Mex.: Cohen, 04;  
Tassin, 02b
- Castine, Me.: Shepard, 48a
- Catalog: Farrington, 15a; Huntington, 88  
Field Museum collection: Farrington, 16  
Minnesota collection: Winchell (N H), 92  
U. S. National Museum collection: Merrill  
(G P), 16a  
Ward-Coonley collection: Ward (H A), 00  
Yale College collection: Dana (E S), 86a  
Yale University collection: Washington, 97
- Catorze, San Luis Potosi, Mex.: Kunz, 86f, g,  
87b
- Cedar, Fayette Co., Tex.: Merrill (G P), 18a
- Celestialite: Smith (J L), 75d
- Central Missouri: Preston (H L), 00a
- Chambord, Que.: Johnston (R A A), 06b
- Charleston, W. Va.: Bailey (S C H), 85
- Charlotte, Tenn.: Troost, 45
- Chattooga Co., Ga.: Kunz, 87d
- Chemical and mineralogical composition: Mer-  
rill (G P), 16e
- Cherokee, Ga.: Howell (E E), 95
- Chesterfield Co., Va.: Cocke, 29
- Chesterville, S. C.: Cohen, 92
- Chihuahua, Mex.: Smith (J L), 55
- Chromite in meteorites: Tassin, 08b; in Coa-  
huila iron: Smith (J L), 81a
- Chulafinnee, Cleburne Co., Ala.: Hidden, 80
- Chupaderos, Mex.: Cohen, 91, 92
- Cid, Davidson Co., N. C.: Pratt, 01b,
- Cincinnati, Ohio: Cohen, 98
- Clackamas, Oreg.: Kunz, 04a

**Meteorites—Continued.**

- Claiborne, Ala.: Hayes (A A), 45; Jackson, 38c
- Classification: Foote Min. Co., 12; Shepard, 67;  
quantitative: Farrington, 11
- Claywater, Wis.: Smith (J L), 76c
- Cleveland, Tenn.: Genth, 87a
- Coahuila, Mex.: Huntington, 87, 89; Lupton, 85;  
Smith (J L), 55, 69a
- Cocke Co., Tenn.: Shepard, 42a
- Colby, Wis.: Ward (H L), 17
- Colfax township, Rutherford Co., N. C.: Kunz,  
90c
- Collections: Ward (H A), 04b  
American Museum of Natural History:  
Hovey, 96a, 07, 12c; Reeds, 17  
arrangement: Brezina, 04  
Field Museum: Farrington, 95, 03a  
largest American: Gratacap, 06  
U. S. National Museum collection: Clarke  
(F W), 89a; Tassin, 02a  
Ward-Coonley: Gratacap, 01c
- Composition: Farrington, 01a; Merrill (G P),  
15c  
minor constituents: Merrill (G P), 16  
relation to earth: Farrington, 14a  
stony meteorites: Merrill (G P), 09b
- Concretions in meteoric irons: Smith (J L), 83
- Cookeville, Tenn.: Merrill (G P), 16b
- Cosby's Creek, Cocke Co., Tenn.: Cohen, 92;  
Troost, 40a
- Costilla, N. Mex.: Hills, 98a
- Cross Roads, Wilson Co., N. C.: Howell, 93a
- Cuba: Solano y Eulate, 72
- Cullison, Pratt Co., Kans.: Merrill (G P), 13a
- Cumberland Mountains, Tenn.: Newberry, 87e
- Cuernavaca, Mex.: Cohen, 03; Ward (H A), 02a
- Current Creek, Colo.: Headden, 08
- Cynthiana, Ky.: Smith (J L), 77d
- Dakota: Jackson, 63b, 66h
- Dalton, Whitfield Co., Ga.: Merrill (G P), 16c;  
Shepard, 83
- Danville, Ala.: Smith (J L), 70
- Daubréelite: Smith (J L), 76b, 78a
- Davis Mountains, Tex.: Farrington, 14
- Deal, N. J.: Shepard, 52; Vaux (R), 30
- De Cewsville, Ont.: Howell (E E), 90a
- Deep Springs, N. C.: Cohen, 92
- Dekalb Co., Tenn.: Troost, 45
- Descubridora, Mex.: Burkart, 74; Zérega, 75
- De Sotoville, Ala.: Brezina, 04a
- Diamonds in meteorites: Carter, 93b; Hunting-  
ton, 92, 94; Kunz, 88e
- Dickson Co., Tenn.: Smith (J L), 75a
- Eagle, Carroll Co., Ky.: Kunz, 90; Prior, 18
- El Capitan, N. Mex.: Howell (E E), 95
- Eldorado Co., Cal.: Shepard, 72
- Ellenboro, Rutherford Co., N. C.: Eakins, 90a
- Elm Creek, Kans.: Howard, 07
- Estacado, Tex.: Howard, 06a
- Estherville, Iowa: Rath, 80; Shepard, 79; Smith  
(J L), 80
- Etching for photographic purposes: Preston  
(H L), 06
- Eustis, Fla.: Merrill (G P), 18c
- Factors in exchange value: Foote (W M), 13
- Fairfield Co., Conn.: Silliman, 09
- Fall, phenomena: Farrington, 96



## Meteorites—Continued.

- Farmington, Washington Co., Kans.: Farrington, 01d; Kunz, 92; Preston (H L), 92a
- Fayette Co., Tex.: Meunier, 88; Ward & Howell, 88, 88a; Whitfield (J E), 88
- Felix, Ala.: Merrill (G P), 01a
- Ferguson, Haywood Co., N. C.: Kunz, 90, 90d, h
- Fisher, Minn.: Merrill (G P), 15; Winchell (N H), 96a, e, 97b
- Floyd Mountain, Va.: Kunz, 91c
- Fluorine and tin in meteorites: Merrill (G P), 18b
- Formation: Allen (E T), 06a
- Formatlán, Jalisco, Mex.: Shepard, 85a
- Forsyth, Ga.: Beall, 30; Cohen, 97a
- Forsyth, Mo.: Shepard, 60
- Forsyth Co., N. C.: Schweinitz, 96
- Fort Duncan, Maverick Co., Tex.: Hidden, 86b
- Fort Pierre, S. Dak.: Holmes (N), 60
- Franceville, Colo.: Preston (H L), 02a
- Frankfort, Ala.: Brush, 69b
- Frankfort, Ky.: Smith (J L), 70a
- Fusion structures: Wiechmann, 82
- Garrett Co., Md.: Foote (A E), 92a
- Gay Gulch, Yukon: Johnston (R A A), 15a
- General: Aguilera, 99; Bailey (S C H), 93; Broadhead, 78a; Cohen, 94; Collier (H B), 13; Farrington, 95, 01c, 92, 15; Foote Min. Co., 12; Hensoldt, 89a; Holder, 04; Honeyman, 88g; Jackson, 71; Leith, 15; Newton, 86; Pickering, 09a; Preston (H L), 98; Reynolds, 19; Shepard, 46a, 81a; Silliman (G S), 59; Smith (J L), 55, 70a; Von Petersdorf, 90; Wadsworth, 83d; Mexico: Cornejo, 70
- Geographic distribution: Farrington, 04a
- Glorieta Mountain, N. Mex.: Cohen, 91, 92 Hills (R C), 14; Kunz, 86a, 87b
- Godhaven, Disco Island, Greenland: Goldsmith, 93a
- Grand Rapids, Mich.: Eastman, 84; Riggs (R B), 85, 87a
- Green Co., Tenn.: Blake (W P), 86; Troost, 45
- Guernsey Co., Ohio: Smith (J L), 61
- Guffey, Colo.: Hovey, 09e
- Guilford Co., N. C.: Shepard, 41
- Hammond, Wis.: Cohen, 92
- Harrison Co., Ind.: Smith (J L), 59a
- Hawaiian Islands: Bingham, 45
- Hayden Creek, Idaho: Hidden, 00
- Haywood Co., N. C.: Shepard, 54
- Heating meteoric stones, effects: Merrill (G P), 18b
- Hendersonville, N. C.: Glenn, 04b; Merrill (G P), 07a
- Henry Co., Va.: Venable, 90
- Holbrook, Ariz.: Foote (W M), 12; Merrill (G P), 12a
- Howard Co., Ind.: Smith (J L), 74
- Hydrocarbon with sulphur: Smith (J L), 75d
- Illinois Gulch, Deer Lodge Co., Mont.: Cohen, 92; Preston (H L), 00
- Independence Co., Ark.: Hidden, 86, 86e
- Indian Valley, Floyd Co., Va.: Kunz, 92b
- Iowa: Smith (J L), 75c; Torrey, 91

## Meteorites—Continued.

- Iredell, Bosque Co., Tex.: Cohen, 03; Foote (W M), 99a
- Iron Creek, Alta.: Coleman, 87
- Iron phosphide: Wherry, 18i
- Ivanpah, Cal.: Cohen, 91, 92; Shepard, 80
- Jackson Co., Tenn.: Troost, 46
- Jennys Creek, W. Va.: Kunz, 86, 86h
- Jerome, Kans.: Washington, 98a
- Jerseyite: Goldsmith, 07
- Jiquipilco, Toluca, Mex.: Nöggerath, 26
- Joe Wright Mountain, Ark.: Cohen, 91
- Kansas, northwestern: Farrington, 02b
- Kendall Co., Tex.: Cohen, 92
- Kenton Co., Ky.: Preston (H L), 92, 93
- Kilbourn, Wis.: Farrington, 14
- Kingston siderite, N. Mex.: Hovey, 12e
- Kiowa Co., Kans.: Bailey (E H S), 90b; Huntington, 91; Snow, 90
- Kokomo, Ind.: Cohen, 92
- La Belle Roca, Durango, Mex.: Whitfield (J E), 89
- Lake Okechobee, Fla.: Merrill, 16d
- Lamar, Johnson Co., Ark.: Kunz, 87
- Laramie Co., Wyo.: Kunz, 88b
- Laurens Co., S. C.: Hidden, 86, 86g
- Leighton, Ala.: Farrington, 02
- Leland, Winnebago Co., Iowa: Kunz, 90e
- Lexington Co., S. C.: Shepard, 81
- Lick Creek, Davidson Co., N. C.: Hidden, 80a
- Lime Creek, Ala.: Cohen, 92
- Linn Co., Iowa: Shepard, 51b, c, 52e
- Lincoln Co., Tenn.: Smith (J L), 61a
- Linnville, N. C.: Cohen, 92; Kunz, 88b
- Linville Mountain, N. C.: Kunz, 90h
- Little Piney, Mo.: Herrick (E C), 39; Shepard, 40
- Lockport, N. Y.: Silliman (jr), 45, 46
- Locust Grove, N. C.: Cohen, 97
- Lonaconing, Garrett Co., Md.: Foote (A E), 92a
- Long Creek, Jefferson Co., Tenn.: Cohen, 92; Shepard, 54
- Los Angeles, Cal.: Jackson, 72a
- Losttown, Ga.: Shepard, 68a, 69
- Louisiana [?!]: Gibbs, 14b
- Louisa Co., Va.: Howell (E E), 91
- Luis Lopez, Socorro Co., N. Mex.: Preston (H L), 00a
- Madison Co., N. C.: Burton, 76; Smith (J L), 60
- Marshall Co., Ky.: Smith (J L), 60
- Mart, Tex.: Charlton, 01; Merrill (G P), 99a, 00
- Maskelynite: Merrill (G P), 18b
- Maverick Co., Tex.: Hidden, 86d
- Mazapil, Zacatecas, Mex.: Hidden, 87, 87b
- Metallic meteorites: Clark (W S), 52
- Meteorite studies: Farrington, 02
- Mexico: Bárcena, 76a; Burkart, 56a, 58, 66, 70b; Eastman, 92; Feuchtwanger, 69; Fletcher (L), 90a; Häpke, 84; Krantz, 55; Smith (J L), 68
- catalog: Castillo, 89, 90
- Durango: Agraz, 09
- iron: Ordóñez, 90
- Mezquital, Mex.: Cohen, 92
- Millers Run, Pa.: Cohen, 04a



## Meteorites—Continued.

Minnesota collection, catalog: Winchell (N H), 92  
 Minnesota, no. 1: Winchell (N H), 94e  
 Minor constituents: Merrill (G P), 13b  
 Missouri: Broadhead, 78a; southeastern: Shepard, 69  
 Misteca, Mex.: Cohen, 92  
 Misteca alta, Mex.: Rammelsberg, 69a  
 Modoc, Kans.: Farrington, 06c; Hovey, 09f; Kunz, 06a; Merrill (G P), 06, 06b  
 Monticellite-like mineral: Merrill (G P), 15b  
 Morristown, Hamblen Co., Tenn: Eakins, 93; Merrill (G P), 96d  
 Mount Joy, Adams Co., Pa.: Howell, 92  
 Mount Morris, N. Y.: Whitlock, 13  
 Mount Vernon, Ky.: Merrill (G P), 03; Tassin, 05  
 Murfreesboro, Tenn.: Troost, 48a  
 Murphy, Cherokee Co., N. C.: Cohen, 92; Ward (H L), 99b  
 Nanjemoy, Md.: Carver, 25  
 Nash Co., N. C.: Smith (J L), 75  
 Nashville, Tenn.: Seybert, 30  
 Nebraska, list: Barbour, 01a  
 Nelson Co., Ky.: Cohen, 92; Smith (J L), 60  
 Ness Co., Kans.: Ward (H L), 99  
 Nevada: Jenney, 09  
 Newberry, S. C.: Shepard, 50  
 New Concord, Ohio: Andrews (E B), 60a; Shepard, 60  
 New Mexico: Genth, 54  
 Newton Co., Ark.: Smith (J L), 65  
 Niagara, N. Dak.: Preston (H L), 02  
 Nobleboro, Me.: Cleaveland, 23  
 North Carolina: Venable, 90a  
 Norwood, Mass., "meteorite," so called: Hovey, 10; Loughlin, 10; Very, 10, 10a  
 Oakley, Logan Co., Kans.: Preston (H L), 00b  
 Oktibbeha Co., Miss.: Cohen, 92; Taylor (W J), 57a  
 Oldham Co., Ky.: Smith (J L), 61a  
 Oldhamite: Merrill (G P), 15b  
 Oregon: Jackson, 59l  
 Origin: Berwert, 17; Browne (P A), 49a; Day (J), 10; Pickering, 09; and structure: Daubrée, 86  
 Oscuro Mountain, N. Mex.: Hills, 02  
 Ovivak, Greenland: Daubrée, 72, 72a; Nordenskjöld, 71, 72, 72a  
 Pacific coast: Whitney, 66d  
 Paulding, Ga.: Watson, 13b  
 Peckhamite: Smith (J L), 80a  
 Perryville, Mo.: Merrill (G P), 12b  
 Persimmon Creek, N. C.: Cohen, 04b; Klein, 04; Tassin, 04  
 Petersburg, Tenn.: Shepard, 57  
 Phosphorus in Saline Township: Farrington, 03b  
 Pickens Co., Ga.: McCallie, 09a  
 Pipe Creek, Brandera Co., Tex.: Ledoux, 89  
 Pittsburgh, Pa.: Silliman (jr), 51b  
 Plainview, Tex.: Merrill (G P), 17, 18  
 Platinum and iridium in meteorites: Davison (J M), 99  
 Plymouth, Ind.: Ward (H A), 95  
 Powder Mill Creek, Cumberland Co., Tenn.: Kunz, 87d, j

## Meteorites—Continued.

Prehistoric: Huntington, 91  
 Pre-terrestrial history: Farrington, 01b  
 Probability of large meteorites having fallen upon the earth: Schwarz (E H L), 09  
 Putnam Co., Ga.: Willet, 54  
 Pyrites crystals: Gibbs, 14a  
 Quinn Canyon, Nev.: Farrington, 02; Jenney, 09a  
 Radioactivity: Quirke, 17b  
 Ranchito, Bacubirito, Sinaloa, Mex.: Cohen, 04  
 Reed City, Mich.: Preston (H L), 03  
 Rensselaer Co., N. Y.: Bailey (S C H), 87  
 Richland, S. C.: Shepard, 50  
 Rich Mountain, N. C.: Merrill (G P), 07b  
 Robertson Co., Tenn.: Smith (J L), 61a  
 Rochester, Ind.: Shepard, 77; Smith (J L), 77d  
 Rockingham Co., N. C.: Genth, 70; Smith (J L), 77; Venable, 90  
 Rockwood, Cumberland Co., Tenn.: Howell, 87; Whitfield (J E), 87b  
 Rodeo, Durango, Mex.: Farrington, 05  
 Ruffs Mountain, iron phosphide in: Wherry, 17h  
 Russel Gulch, Colo.: Smith (J L), 66a, 67  
 Sacramento Mountains, Eddy Co., N. Mex.: Foote, 97  
 St. Croix Co., Wis.: Fisher (D), 87  
 Ste. Genevieve, Mo.: Ward (H A), 01  
 St. Francois Co., Mo.: Cohen, 92  
 Saline, Kans.: Farrington, 02a, 03b  
 Salt Lake City, Utah: Dana (E S), 86c  
 Salt River, Ky.: Cohen, 92; Silliman (jr), 51b  
 Sams Valley, Oreg.: Foote (W M), 15  
 San Angelo, Tex.: Preston (H L), 98a  
 San Emigdio Range, San Bernardino Co., Cal.: Merrill (G P), 88b, 89a  
 San Gregorio, Mex.: Frenzel (A), 98; Smith (J L), 71a  
 Santa Rosa (=Bonanza, N. Mex.), Mex.: Cohen, 92; Shepard, 66c  
 Savisavick, Greenland: Shepard, 66b  
 Scott City, Kans.: Merrill (G P), 12  
 Scriba, N. Y.: Cohen, 92  
 Searsmont, Me.: Shepard, 71a; Smith (J L), 71  
 Selma, Ala.: Hovey, 07d; Merrill (G P), 07  
 Seneca River, Cayuga Co., N. Y.: Shepard, 53  
 Shelburne, Ont.: Borgström, 05; Farrington, 06; Johnston (R A A), 05a  
 Shingle Springs, Cal.: Cohen, 92; Silliman (jr), 73a  
 Shrewsbury, Pa.: Farrington, 10a  
 Sierra Madre Range, Colo.: Shepard, 66b  
 Silicate inclusion, Toluca: Tschermak, 09  
 Skookum, Yukon: Johnston (R A A), 15a  
 Smithland, Livingston Co., Ky.: Cohen, 92; Troost, 46  
 Smithville, De Kalb Co., Tenn.: Glenn, 04b; Huntington, 94a  
 South Bend, Ind.: Farrington, 06  
 Specific gravity: Farrington, 97a  
 Staunton, Va.: Cohen, 91, 92  
 Stewart Co., Ga.: Smith (J L), 70b  
 Structure: Farrington, 01; Huntington, 86  
 Stutsman Co., N. Dak.: Huntington, 90  
 Summit, Blount Co., Ala.: Kunz, 90



## Meteorites—Continued.

- Sundry meteorites: Clarke (F W), 89, 90, 91; Rath, 75a  
 Taney Co., Mo.: Kunz, 87d  
 Tazewell, Claiborne Co., Tenn.: Shepard, 54; Smith (J L), 55  
 Texas: Cummins, 92b; Howard, 06; Silliman (jr), 46  
 Thomson, Ga.: Merrill (G P), 09  
 Times of fall of meteorites: Farrington, 10  
 Toluca, Mex.: Cohen, 91, 92; Krantz, 57; Reichenbach, 57; Tschermak, 09; Wöhler, 56; silicate inclusion: Tschermak, 09  
 Tombigbee River, Ala.: Foote (W M), 99  
 Tonganoxie, Leavenworth Co., Kans.: Bailey (E H S), 91a; Snow, 91  
 Trenton, Wis.: Smith (J L), 69  
 Troilite: Smith (J L), 75b  
 Tucson, Ariz.: Brush, 63c; Fletcher (L), 90; Genth, 55a; Shepard, 54a; Smith (J L), 55; Whitney, 63c  
 Union Co., Ga.: Shepard, 54  
 United States: Farrington, 02  
 Waconda, Kans.: Patrick, 77; Shepard, 76a; Smith (J L), 77  
 Waldron Ridge, Claiborne Co., Tenn.: Kunz, 87d  
 Walker Co., Ala.: Cohen, 98a; Troost, 45  
 Ward's work upon: Farrington, 06d  
 Warrenton, Mo.: Smith (J L), 77d  
 Washington, Kans.: Kunz, 91c; Snow, 90a  
 Waterloo, Seneca Co., N. Y.: Shepard, 51b, c, 52e  
 Waterville, Me.: Wadsworth, 83  
 Wayne Co., Ohio: Smith (J L), 64a  
 Welland, Ont.: Davison (J M), 91; Howell (E E), 90a  
 Weston, Conn.: Silliman, 08, 10a  
 White Sulphur Springs, W. Va.: Fletcher (L), 87  
 Whitfield Co., Ga.: Hidden, 81a; Merrill (G P), 16c  
 Wichita Co., Tex.: Cohen, 91, 92; Mallet, 84  
 Widmannstaetten figures: Smith (J L), 79a  
 Willamette, Oreg.: Eberle, 05; Hovey, 06c; Ward (H A), 04a; Winchell (N H), 05a  
 Williamsport, Pa.: Owens (W G), 92  
 Williamstown, Ky.: Howell, 08, 08a  
 Winnebago, Iowa: Eaton (E N), 91; Kunz, 90, 90f; Torrey, 91  
 Winnebago Co., Wis.: Newton, 93  
 Xiquipilco, Mex.: Taylor (W J), 56  
 Yanhuítlan, Mex.: Castillo, 65; Rammelsberg, 69a; Río de la Loza, 65, 65a  
 York, Nebr.: Barbour, 98c  
 Zacatecas, Mex.: Burkart, 59; Cohen, 92  
 Mexican boundary survey: Emory, 57, 57a  
 Mexico.  
 Aguascalientes: Díaz de León, 94  
 Altar district, Sonora: Tolman, 12d  
 Analyses: Mex I G, 13b  
 Axalapazco de Tacámbaro: Rubio, 06  
 Bibliography: Aguilar y Santillán, 98, 02, 08, 16, 18; Thayer, 14  
 Chavarrillo, Santa Maria Tatetla, Vera Cruz, et Orizaba: Böse, 06b  
 Chiapas and Tabasco: Halse, 06

## Mexico—Continued.

- Chihuahua, geology: Bagg, 08; Botsford, 11; Buelna, 97a; Burrows (R H), 10; Seamon, 06, 10  
 northeastern: Rogers (R V), 09  
 Rio Grande region: Newberry, 83c  
 Choix-Guadalupe y Calvo mining districts: Warwick, 07  
 Coahuila: Frazer, 84g; Haarman, 13; kaolin in a coal: Castro, 09  
 Colima: Dollfus, 67c  
 Durango: Buelna, 97a  
 Esperanza à México: Ordóñez, 06b  
 Falls of Bassasseachic, Chihuahua: Self, 94  
 General: Aguilera, 97c; Diener, 07; Dollfus, 67b; Hill (R T), 02a; Maclure, 31; Ordóñez, 97, 98b; Pease, 48; Prudhomme, 82; Rath, 84e; Sainte-Claire Deville, 67; Schleiden, 34; Sebbin, 04  
 Geologic and geographic aspects: Hill (R T), 06a  
 Geologic investigation, history of: Aguilera, 05  
 Geological structure: Aguilera, 07b  
 Geology and natural resources: Hill (R T) 07c  
 Guanajuato district: Villarello, 09g  
 Guaynopita district, Chihuahua: Hovey, 06, 06k  
 Guerrero: Bárcena, 74c; Campo Morado district: Finch (J W), 10  
 Hostotipaquillo and the Lerma River: Ordóñez, 08b.  
 Instituto Geológico de México: Aguilera, 09d; Paredes, 17  
 International Geological Congress, Tenth, excursions: Hovey, 06c  
 Ixmiquilpan Valley, Hidalgo: Paredes, 09b  
 Ixtapalapa: Puga, 91a  
 Jacala, Hidalgo: Camacho, 17  
 Jorullo: Felix, 88  
 Lower California: Bonillas, 13; Böse, 13a; Castillo, 85; Diguet, 00; Eisen, 95, 00; Engerrand, 13; Fleury, 69; Flores, 13; Grewing, 48; Guillemin Tarayre, 67; Méx I G, 13; Taylor (A S), 69; Wittich, 09  
 Mesozoic history: Stanton, 18  
 Metamorphic ranges in Sonora: Merrill (F J A), 08c  
 Metlacueyatl: Ordóñez, 09a  
 Mexico (Valley): Lobato, 76  
 México à Jalapa: Ordóñez, 06a  
 México à Patzcuaro et Uruapam: Ordóñez, 06d  
 México à Tehuacán: Aguilera, 06  
 Mexican Plateau, growth and decay: Hill (R T), 08  
 Michoacán: Caballero, 10  
 Mineral-del Oro: Ramírez, 72  
 Morelos: Bárcena, 74c  
 Nevado de Toluca: Dollfus, 67c; Villada, 90; Waitz, 10a  
 Northern Mexico: Burrows (R H), 09; Wislizenus, 48  
 Nuevo León: Frazer, 84g  
 Oaxaca: Felix, 90; Flores, 09a  
 Orizaba: Scovell, 93; Waitz, 10b  
 Paleotrochis: Diller, 99a; Williams (H S), 99  
 Panama straits, ancient: Dickerson, 17c  
 Peñón de los Baños: Puga, 92



## Mexico—Continued.

- Prehistoric man: Bárcena, 97  
 Puebla, Matamoros Izúcar, Chialutla, and Acatlán: Ramírez, 82  
 Ramos-Catorze, San Luis Potosí: Burkart, 33b  
 San Luis Potosí à Tampico: Böse, 06g  
 Sierra Almoloya: Hill (R T), 07, 08a  
 Sierra de El Oro, Durango: Roldán, 11  
 Sierra de Guanajuato: Villarello, 06d, 09g  
 Sierra de Ozumatlán: Caballero, 06  
 Sierra de Santa Catarina: Waitz, 10b, 12a  
 Sierra Madre, Chihuahua: Hovey, 05i, 06j, 07a, b, 08e  
 Sierra Madre Durangueña: Rouaix, 10  
 Sierra Madre Occidental, Durango: Hewett, 03; Villafañá, 12a; Weed, 02d  
 Sierra Nevada: Freudenberg, 09  
 Sinaloa: Buelna, 97a; Weidner, 84  
 Sonora: Buelna, 97a; Fleury, 69  
     southern Mex.: Botsford, 11  
     western coast: McGee, 96e  
 Sonoran glaciation: McGee, 06; Merrill (F J H), 06a  
 Tehuacán: Aguilera, 02a  
 Tehuacán à Zapotitlán et San Juan Raya: Aguilera, 06  
 Tehuantepec Isthmus: Böse, 05, 06h; Del Rio, 49; Hovey, 07e; Maqueo, 09; Robles, 49; Spear, 72  
 Tiburon Island: Jones (F A), 10  
 Toluca: Burkart, 27  
 United States boundary: Marcou, 67b  
 Vera Cruz: Villada, 10c  
 Vera Cruz-Mexico City: Dollfus, 67  
 Xochitepec, Guerrero: Ramírez, 75  
 Yucatán: Engerrand, 10a; Heilprin, 91b; Huntington, 12a  
 Zacatecas: Amador, 00; Burckhardt, 06  
 Zacatecas to Mexico: Rath, 86g
- Economic geology.*  
 Aguascalientes, Santa Francisca mine: Cook (E H), 07  
 Ajuchitlán district, Toliman district, Quere-taro: Lewis (S J), 10  
 Alabaster, Tecali: Bárcena, 74a  
 Alamo district, Lower California: Wankowski, 01  
 Alamos-Promonitos district, Sonora: Brinegar, 10  
 Aldama district, Guerrero: Híjar y Haro, 08  
 Almoloya, Chihuahua, Villafañá, 14  
 Altar, Sonora: Maynard, 08  
 Alum, Toliman: Galeotti, 38a  
 Analco, Hostotipaquillo, Jalisco: Landero, 93a  
 Angangeco district, Tlalpujahua: Burkart, 28  
 Angangueo, Michoacán: Ordóñez, 04, 05g  
 Antimony: Flores, 16a  
     El Altar, Sonora: Halse, 94  
     Fresnillo, Zacatecas: Amador, 16  
     Sonora: Cox (E T), 80a; Douglas, 81; Lewis (H C), 82d  
 Aranzazu, Zacatecas: Villarello, 06f  
 Arizpe district, Sonora: Dufourq, 10  
 Arteaga district, Chihuahua: Pockman, 10; Winston, 09  
 Arzate, Durango: Villarello, 05b

## Mexico—Continued.

*Economic geology—Continued.*

- Bismuth, Sta. Rosa, Guanajuato: Wittich (E), 10j  
 Building stone: Roel, 06; Teilo, 17  
     Naucalpán y Huisquilucan: Mex I G, 17  
     San Lorenzo: Lazo, 05  
 Calabacillas mine, Chihuahua: Sill, 10  
 Campeche, Champoton: Urbina, 09b  
 Cañada, Tetela de Ocampo, Puebla: Gómez, 16  
 Catorce district, San Luis Potosí: Chism, 89a  
 Cerro de Mercado, Durango: Birkinbine, 85  
 Chalchihuites district: Fernández, 83  
 Chihuahua: Griggs, 07; Paredes, 12; Rath, 86f; Weed, 02c  
     Dolores mine: Farish, 07  
     Las Plomosas district: Burrows (R H), 10a  
     Naica mineral district: Reynoso, 09  
     native silver: Brodie, 10  
     San Ygnacio mine: Peragallo, 09  
 Chiluca and Cantera: Roel, 06  
 Christo district: Gerolt, 26, 27  
 Coal: Guerra, 06; Hill (R T), 13; Monroy, 69a; Ramírez, 92; Ritter, 06b; Schwarz, 08, 12  
     Coahuila: Hay, 91; Ludlow, 06, 09; Martínez Baca, 91; Ordóñez, 08, 08a; Ramírez, 82j; Las Esperanzas: Ludlow, 02; Ries, 03c; northern: Aguilera, 09c; Sabinas field: Schmitz, 85; Tuttle, 95; Santa Rosa district: Adams (W H), 82  
     Guerrero: Manross, 65  
     Huasteca: Anda, 76; Bustamante, 82  
     Huauchinango: Ramírez, 82i  
     Jalapa: Ramírez, 82e  
     Michoacán, Huetamo: Ramírez, 82d  
     Morelos, Tetecala: Ramírez, 82c  
     Oaxaca: Birkinbine, 10; Ramírez, 82b  
     Puebla: Ramírez, 82; Tulitic: Ramírez, 82f  
     Sierra Rica district, Chihuahua: Philips (W B), 05a  
     Tlaxcala: Ramírez, 81, 82a  
     Triassic, Sonora: Dumble, 00  
     Zacualtipán, Hidalgo: Cope, 86a  
 Coalcoman: Anda, 83  
 Cobalt: Caballero, 02; Jalisco: Navarro, 07  
 Coke, Triassic, Sonora: Dumble, 00  
 Comanja, Jalisco: Ramírez, 82g  
 Combustibles: López Monroy, 69a  
 Copalquin and Lemon mineral zone, Durango: Buelna, 97  
 Copete district, Sonora: Merrill (F J H), 06b; Nicholas, 11  
 Copper: Balarezo, 09; Bordeaux, 07; Weed, 07  
     Asientos: Newman, 07  
     Alamos district, Sonora: Pearce, 10  
     Cananea, Sonora: Austin, 03; Brinsmade, 07e; Elsing, 13; Emmons (S F), 10a; Hill (R T), 03a, b; Mathez, 03; Steel, 03; Weed, 02g, 03j; Woodbridge, 06a  
     Chihuahua, Guaynopa district: Phillips (W B), 10a; Terrazas: Baron, 09a  
     Coahuila, Sierra Mojada district: Van Horn (F R), 11a  
     Durango: Rangel, 11; Sierra de El Oro: Roldán, 11  
     Guerrero, Cerro Seco: Paredes, 09  
     Jalisco, Magistral district: Ordóñez, 13



## Mexico—Continued.

*Economic geology—Continued.*

- Lower California: Krusch, 99; Boleo: Fuchs, 86; Saladin, 92  
 Michoacán: Bigot, 08; Haro, 82; Inguaran: Cumenge, 98  
 Moctezuma deposit: Dinsmore, 08  
 Nacozari district: Russell (B E), 08; Los Pilares mine: De Kalb, 10a; Emmons (S F), 06d  
 Puebla, Sierra Magistral district: Brinsmade, 13; Teziutlán: Gómez, 16a; Lukis, 98  
 Sahuaripa district: Hynes, 12; Nelson (C N), 06  
 San Jose district, Tamaulipas: Kemp, 05  
 Sierra Mojada district: Van Horn (F R), 12  
 Sinaloa: Rickard (F), 04  
 Santa Cruz: Merrill (F J H), 07c  
 Sonora: Merrill (F J H), 07d; Rickard (F), 04; Storch, 96; Copete district: Merrill (F J H), 06b; Nicholas, 08, 11; Douglas copper properties: Nicholas, 08; Elisa mine: Lee (M L), 12  
 Tapalpa, Jalisco: Villafañá, 05  
 Terrazas: Baron, 09a  
 Velardeña district, Durango: Spurr, 08a  
 Vera Cruz, Zomelahuacan district: Fishback, 10a  
 Zacatecas: Rice (C T), 08e; Aranzazú: Villarelo, 06f; Concepcion del Oro district: Chase (T), 09  
 Diente: McCormick, 07  
 Dry placers in northern Sonora: Merrill (F J H), 08d  
 Durango: Buelna, 94a; Promontorios silver mine: Lincoln, 08  
 El Chico district, Hidalgo: Thomas (K), 09  
 El Doctor mines: Murphy, 07  
 El Dorado mineral deposits: Balarezo, 09a  
 El Oro district: Hill (R T), 05a; Rickard (T A): 06a; Smith (T E), 06; Esperanza mine: Hindry, 09; San Rafael vein: Allan (F L), 15  
 El Roble Jalisco: Ramírez, 82g  
 El Triunfo y San Antonio, Lower California: Bishop, 16  
 Etzatlán district, Jalisco: Von Osdel, 02  
 Fresnillo region, Zacatecas: Arenas, 49, 60, 71; Church, 07; Silliman (jr), 83; Velásquez de León, 50  
 Gems: Kunz, 02a  
 General: Aguilera, 97d; Burkart, 36; Combes, 67; Díaz Barriga, 05; Egloffstein, 64; García, 81; Gerolt, 64; Guillemín Tarayre, 67c; 69; Hill (R T), 01b; Naumann, 98; Ordóñez, 05j; Wittich, 10m  
 Gold: de Cornely, 99; Ordóñez, 98; Ramírez, 16  
 Altar, Sonora: Waring, 97  
 Arteaga district, Chihuahua: Pockman, 10; Winston, 09  
 Calabacillas: Geddes, 09; Sill, 10  
 Chihuahua district: Phillips (W B), 10a  
 Dolores mine: Farish, 07  
 Durango: Rangel, 11; Copalquin: Fowler (F B), 00; Villarelo, 05b  
 El Chico district, Hidalgo: Thomas (K), 09  
 El Oro: Rickard (T A), 06a; Smith (T E), 06; Esperanza mine: Hindry, 09

## Mexico—Continued.

*Economic geology—Continued.*

- El Rayo mine: Rice (C T), 08b  
 Guanajuato, El Pinguico district: Balarezo, 10; Guanajuato district: Botsford, 09, 10a; La Luz: Church, 07a; Pozos camp: Megraw, 10; San Felipe: Villarelo, 10d  
 Jalisco, Hostotipaquillo district: Lewis (S J), 10a; Río de Santiago: Capilla, 10a  
 La Ciénega, Sonora: Hill (R T), 02d  
 Lluvia de Oro district: Burrows (R H), 07; Tays, 10  
 Los Reyes mine, Oaxaca: Smith (A H), 05  
 Lower California: Orcutt, 89; Calamahi: Martínez Baca, 87; Cerros Island: Hausmann, 91; Santa Clara: Landero, 93  
 Michoacán: Villarela, 05a; Ostula: Matute, 87; Tlalpujahua district: Gonzales, 10  
 Minerals accompanying: Ramírez, 16  
 Montezuma district, El Tigre mine: Herrick (R L), 09a  
 Nuevo Laredo, Nuevo León: Aguilera, 94a  
 Oaxaca: Capilla, 10  
 Pachuca, San Rafael y Anexas: Girault, 10  
 Panuco Mountain, Coahuila: Frazer, 86  
 Parral district: Smith (F W), 10  
 Pueblo, Tetela del Oro: Honigman, 16  
 Querétaro, Toliman district: Lewis (S J), 10  
 San Pedro district, San Luis Potosí: Laird, 05  
 Santa Bárbara: Rice (C T), 08b, c  
 Santiago River: Capilla, 10a  
 Sierra de El Oro: Roldán, 11  
 Sinaloa: Merrill (F J H), 06c; San José de Gracia: Tays, 09a  
 Sonora: Merrill (F J H), 08d; Altar mines: Maynard, 08; Alamos-Promonitos district: Brinegar, 10; Arizpe district: Dufourq, 10; Copete: Nicholas, 11; Mulatos district: Janin, 90; Sahuaripa district: Nelson (C N), 06; Sonora Valley: Hafer, 12  
 Sultepec district: Buelna, 94; Halse, 94b  
 Vera Cruz, Zomelahuacan district: Fishback, 10a  
 Zacatecas: Halse, 94a, c; Concepcion del Oro district: Chase (T), 09  
 Zacualpán: Villafañá, 09; Villarela, 06  
 Grahamite, Huasteca: Kimball, 76  
 Granite: Aguilera, 08a  
 Graphite: Castillo, 75; Vivar, 16  
 Santa María mines: Hess, 09d; Hornaday, 12b; Mills (J C), 08  
 Sonora, La Colorado: Hess, 09c  
 Guadalcázar, San Luis Potosí: Ramírez, 79a  
 Guadeloupe y Calvo: Schleiden, 39  
 Guanajuato: Blake (W P), 02b; Monroy, 88  
 El Pinguico district: Balarezo, 10  
 Guanajuato district: Botsford, 09, 10a; Henrich, 04; Hill (R T), 04; Probert, 10; Rice (C T), 08g  
 La Luz district: Church, 07a; Spilsbury, 13  
 Guaynopa district, Chihuahua: Phillips (W B), 10a  
 Guerrero, Bravos district: Flores, 12  
 Campo Morado district: Finch (J W), 10  
 Cuitlanapa: Ramírez, 77  
 Pregones district: Laguerenne, 09



## Mexico—Continued.

*Economic geology*—Continued.

- Hidalgo: Bárcena, 77b; González, 11; Grothe, 12
- Hostotipaquillo district, Jalisco: Cummings, 05; Lewis (S J), 10a; Ordóñez, 16b
- Iron deposits: Aguilera, 09b; Birkinbine, 85; Castillo, 52; Ordóñez, 10, 10a, b
- Chihuahua, Naica district: Reynoso, 09
- Coahuila: Frazer, 84d
- Durango: Birkinbine, 84; Hill (R T), 93f; Rangel, 11; Silliman (jr), 82; Cerro del Mercado: Burkart, 58; Farrington, 04; Kleinschmidt, 84; Rangel, 02; Weidner, 77; Iron Mountain: Birkinbine, 85; Witherbee, 02
- Guerrero: Manross, 65; Aldama district: Híjar y Haro, 08
- hematite and martite ores: Hill (R T), 93c
- Lower California: Wittich, 15, 16b
- Nuevo León: Frazer, 84d; Carrizal: Caballero, 05
- Oaxaca: Birkinbine, 10; Bonillas, 11
- San Carlos: Caracristi, 10a
- Sinaloa: Silliman (jr), 82
- Tatatila, Vera Cruz: Capilla, 04
- Vaquerías, Hidalgo: Villarelo, 02
- Isthmus of Tehuantepec: Hartley, 17
- Ixmiquilpan Valley, Hidalgo: Paredes, 09b
- Jalapa: Ramírez, 82e
- Jalisco: Guillemin Tarayre, 67b; Villafañá, 16
- Hostotipaquillo district: Lewis (S J), 10a
- Magistral copper district: Babb, 09a
- Santiago River silver-bearing placers: Capilla, 10a
- Kaolins of Yextho: Aguilera, 08
- La Campechana, Guanajuato: Ramírez, 82g
- Las Minas district, Vera Cruz: Brinsmade, 16
- Las Vigas district: Burrows (R H), 10a
- Lava field at Coyoacán: Wittich (E), 10h
- Lead, Chihuahua, Las Plomosas: Burrows (R H), 09, 10a
- Naica district: Reynoso, 09
- Santa Eulalia: Cahill, 04; Rice (C T), 08, 08a
- San Ygnacio: Peragallo, 09
- Coahuila Boquillas: Moser, 11; Sierra Mojada district: Van Horn (F R), 11a, 12
- Diente: McCormick, 07
- Durango: Rangel, 11; Topia: Graham (T C), 08
- Guerrero, Pregones district: Laguerenne, 09
- Hidalgo, Cardonal: Villada, 10a
- Puebla: Honigmann, 16a
- Santa Bárbara: Rice (C T), 08c
- Tehuacán: Castillo, 50
- Lead-silver, Puebla: Honigmann, 16a
- Lluvia de Oro district, Chihuahua: Burrows (R H), 07; Tays, 10
- Los Pilares mine, Nacozari district, Sonora: De Kalb, 10a; Emmons (S F), 06d
- Lower California: Castillo, 61, 74, 16; Guillemin Tarayre, 67; Lowry, 01; Ramos, 87
- Magistral district, Jalisco: Ordóñez, 13
- Maguarichic, Rayon district, Chihuahua: Bagg, 05b
- Manganese: Burkart, 56, 67a; Lower California: Halse, 92; Wallace (H V), 11, 11b; Mulege: McQuesten, 16; Wallace (H V), 16

## Mexico—Continued.

*Economic geology*—Continued.

- Mapimi: Villarelo, 06e, 07a
- Marble: Aguilera, 08a; Oaxaca: Keilhack, 07
- Metalliferous deposits: Villarelo, 08a
- Mezquital del Oro, Zacatecas: Ordóñez, 94b
- Michoacán: Bustamante, 98; Grothe, 12a; Salazar S., 13
- Coalcoman: Urquiza, 82
- Ostula: Matute, 87
- Tlalpujahua district: Gonzáles, 10
- Minas Nuevas à Hidalgo del Parral: Robles, 06
- Mineral del Oro: Ramírez, 72
- Mineral deposits, distribution: Aguilera, 02; geographic: Aguilera, 16; geologic: Aguilera, 16a
- Mineral resources: Aguilera, 01; Hernández, 55; Hill (R T), 07b; Merrill (F J H), 07b; Ordóñez, 01b; Ramírez, 84; Chihuahua and Coahuila: Brodie, 10a; Durango: Rangel, 11
- Guerrero: Niven, 10
- Mining industry: Grothe, 12; Ordóñez, 08c
- Moctezuma district, Sonora: Clere, 05; Dinsmore, 08
- Mode of filling of some Mexican ore deposits: Villarelo, 09f
- Molybdenite, San Sebastián, Jalisco: Landero, 80
- Nacozari district, Sonora: Russell (B E), 08
- Natural coke, Santa Clara coal field, Sonora: Dumble, 00b; Ochsenius, 00
- Northern Mexico: Rémond, 66
- Oaxaca: Clark (M), 97; Hooker, 87
- Etla, marble: Keilhack, 07
- gold deposits: Capilla, 10
- iron and coal deposits: Birkinbine, 10
- Taviche district: Place, 07
- Tehuantepec district: Flores, 09b
- Oil indications, Pacific coast: Palacios, 18
- Oil possibilities, southern Tamaulipas: Ordóñez, 18
- Onyx: Bárcena, 76b; genesis and classification: Lawton, 10
- Onyx marble, Jimulco, Coahuila: Ordóñez, 01a, 05h
- Opals: Bárcena, 73a; Queretaro: Foote (A E), 86
- Ore bodies without walls: Merrill (F J H), 08e
- Ore deposits: Emmons (W H), 10a; Gerolt, 26a; Villarelo, 10a; geologic distribution: Aguilera, 01
- Ore shoots and magmatic differentiation: Pope, 11
- Oro district: Gerolt, 27c
- Pachuca district, Hidalgo: Aguilera, 97e; Ordóñez, 01; Rice (C T), 08f; San Rafael y Anexas: Girault, 10
- Palmarejo, Jalisco: Hoppenstedt, 94
- Parral district, Chihuahua: Garrison, 07a; Scalia, 17; Smith (F W), 10
- Peat: Alcalá, 06; San Nicolás Tolentino, Puebla: Balarezo, 10a
- Peñoles, Oaxaca: Híjar, 05



## Mexico—Continued.

*Economic geology*—Continued.

Petroleum: Anda, 77; Bustamante, 06, 18; Day (D T), 09c, 17; DeGolyer, 18d; Garfias, 15a; Guerra, 06; Hayes, 09c; Hornaday, 12a; Huntley, 15; Iglesias, 18; Mennell, 10; Ordóñez, 10a, 14, 16a; Skertchly, 10, 12; Stewart (P C A), 15; Urbina, 15; Villarello, 08, 08a, 09d, e; Wilson (E M) 17  
 accumulation: Garfias, 12; Villarello, 10b  
 Aragón, origin: Villarello, 04a  
 Dos Bocas: Villarello, 09c  
 eastern Mex.: Dumble, 15a  
 Furbero field: De Golyer, 15a  
 Isthmus of Tehuantepec: Hartley, 17  
 northeastern Mex.: Garfias, 12, 15; White (I C), 13  
 Pichucalco, Chiapas: Alcalá, 03  
 submarine deposits: Urbina, 18  
 Tampico field: Ball (S H), 11  
 Tampico-Tuxpam region: De Golyer, 15  
 Vera Cruz: Ordóñez, 07  
 Juan Casiano field: Hornaday, 13  
 Panuco: Urbina, 16  
 Phosphate, Monterrey, Nuevo Leon: Flores, 16, 16b; Zacatecas: Burckhardt, 07  
 Physical and geological features of Mexico mining: Ordóñez, 09  
 Piedras Verdes disseminated copper zone, Alamos district, Sonora: Pearce, 10  
 Pinguico district, Guanajuato: Botsford, 09; Church, 06  
 Pinitos and Azul mountains, Sonora: Petre, 03  
 Planchas de Plata: Merrill (F J H), 06e  
 Potrillos, Durango: Patoni, 17  
 Pozos camp, Guanajuato: Megraw, 10  
 Precious stones: Kunz, 02a; Lower California: Wittich, 14, 16a  
 Providencia district, San Felipe, Guanajuato: Villarello, 10d  
 Puebla, Matamoros Izúcar, Chiautla, and Acatlán: Ramírez, 82; Sierra Magistral: Brinsmade, 13  
 Quicksilver: Castillo, 71; Merrill (F J H), 06; Sandberger, 75; Villarello, 05d  
 Chiquilistlán, Jalisco: Villarello, 04c  
 Dulces Nombres, San Luis Potosí: Babb, 09  
 Guadalcázar, San Luis Potosí: Ramírez, 79a; Rundall, 95  
 Guanajuato: Galeotti, 38  
 Guerrero: Villarello, 05c; Huitzuco: Halse, 95; Pagliucci, 05; Villarello, 03  
 Palmas, Durango: Villarello, 03  
 Querétaro: Bárcena, 73  
 San Luis Potosí, Dulces Nombres deposit: Babb, 09  
 Ramos and Catorze, San Luis Potosí: Burkart, 31  
 Real del Monte, Hidalgo: Ordóñez, 99; Rice (C T), 08f  
 Real de Xichu district, Guanajuato: Hafer, 10  
 Río Grande region, Coahuila: Schmitz, 85  
 Río Plato mine, Chihuahua: Baron, 09  
 Sahuaripa district, Sonora: Hynes, 12; Nelson (C N), 06  
 Sahuayacán district, Chihuahua: Bagg, 05; Treadwell, 05

## Mexico—Continued.

*Economic geology*—Continued.

Saline deposits of Carmen Islands: Cook (E H), 08  
 Salt: Zarate, 17; Ojo de Liebre, Lower California: Böse, 14; Wittich, 16, 16c  
 San Carlos iron deposits: Caracristi, 10a  
 San Javier district, Sonora: Nelson (C N), 10  
 San José, Tamaulipas: Williams (J), 87  
 San José del Oro: Galeotti, 38b  
 San Juan del Río Rancho, Sonora: Cherry, 66  
 San Luis Potosí, Dolores mine, Matahuala: Spurr, 12a; Guadalcázar: Ramírez, 77a  
 San Miguel Peras, Oaxaca: Girault, 16  
 San Miguel Tenango, Zacatlán, Puebla: Gómez, 16b  
 San Nicolás del Oro: Ramírez, 75b  
 San Nicolás mining district, Tamaulipas: Wentworth, 12  
 San Pedro district, San Luis Potosí: Finlay (G I), 03  
 Santa Clara district, Lower California: Lander, 93  
 Santa Eulalia district, Chihuahua: Aiken, 03; Argall, 03; Brinker, 13; Hill (R T), 03; Lane (L), 09; Merrill (F J H), 09; Prescott, 15; Rice (C T), 08, 08a  
 Santa Gertrudis mine: Chase, 10  
 Santa María del Río, San Luis Potosí: Manzano, 02, 17  
 Santa Rosa, Múzquiz, Coahuila: Hill (R T), 92e; Peña, 16  
 Santiago, Zacatecas, San Luis Potosí: Burkart, 33a  
 Santiago y Anexas mines, Michoacán: Villarello, 05a  
 Selenium with pyrite, gold, and silver: Pearce, 02a  
 Shear zones: Merrill (F J H), 07  
 Sierra, Guerrero: Laguerenne, 82  
 Sierra de El Oro, Durango: Roldán, 11  
 Sierra del Carmen, Coahuila: Servín, 17  
 Sierra de Guanajuato: Villarello, 06h  
 Sierra Madre: Bagg, 06; Buelna, 97; Warwick, 06  
 Sierra Mojada, Coahuila: Chism, 87; Fechet, 93; Malcolmson, 01; Ramírez, 77b, 80  
 Sierra Rica and trans-Concho country, Chihuahua: Caracristi, 09  
 Silver: Balarezo, 09; Bordeaux, 07, 08, 10; Halse, 00; Mather, 33b  
 Atotonilco, Chico: Gerolt, 27a  
 Chihuahua: Brodie, 10; Farish, 07; Kimball, 70; Arteaga district: Pockman, 10; Batopilas: Brodie, 10; Río Plata mine: Baron, 09; Santa Eulalia mines: Cahill, 04; Kimball, 70a; Merrill (F J H), 09; Rice (C J), 08, 08a; San Ygnacio mine: Peragallo, 09  
 Coahuila: Frazer, 84d; Sierra Mojada district: Van Horn (F R), 11a  
 Durango: Lincoln, 08; Rangel, 11; Villarello, 05b; Reyes district: Lord (P B), 11; Velardeña district: Spurr, 08a  
 El Chico district, Hidalgo: Thomas (K), 09  
 El Doctor mines: Murphy, 07



## Mexico—Continued.

*Economic geology*—Continued.

- Silver: Fresnillo: Arenas, 71; Proano mine: Church, 07
- Guanajuato: Church, 07a; Rice (C T), 08g; El Pinguico district: Balarezo, 10; Guanajuato district: Botsford, 09, 10a; Probert, 10; San Felipe: Flores, 05; Villarello, 10d
- Guaynopa district: Phillips (W B), 10a
- Guerrero, Brabos district: Flores, 12; Pregones district: Laguerenne, 09
- Hostotipaquillo: Ordóñez, 08b
- Jalisco, alluvial deposits: Capilla, 10a
- Lerma River: Ordóñez, 08b
- Lower California: Guillemin Tarayre, 67
- Michoacán: Villarello, 05a
- Montezuma district, El Tigre mine: Herrick (R L), 09a
- Nuevo León: Frazer, 84d
- Oaxaca, Taviche district: Place, 07
- Pachuca and Real del Monte district: Rice (C T), 08f
- Pachuca district: Chase, 10; Keyes, 10n; Ordóñez, 98c
- Parral district: Garrison, 07a; Rice (C T), 08d
- Planchas de Plata: Merrill (F J H), 06e
- Pozos camp: Megraw, 10
- Promontorio mine: Lincoln, 08
- Puebla: Honigmann, 16a
- Querétaro, Toliman district: Lewis (S J), 10
- Real de Xichu district: Hafer, 10
- San Javier district: Nelson (C N), 10
- Santa Bárbara silver-lead mines: Rice (C T), 08c
- Santa Francisca mine, Aguascalientes: Cook (E H), 05
- Santa Rosa, Chico: Gerolt, 27b
- Santiago River placers: Capilla, 10a
- Sierra de El Oro: Roldán, 11
- Sierra Mojada district: Van Horn (F R), 12
- Sinaloa, northern: Tays, 09
- Sonora, Alamos-Promonitos district: Brinegar, 10; Arizpe district: Dufourq, 10; Las Chispas mines: Russell (B E), 08a; Sahuaripa district: Hynes, 12; Sonora Valley: Hafer, 12
- Sultepec district: Halse, 94b
- Tamaulipas, San Nicolás district: Wentworth, 12
- Tapalpa, Jalisco: Villafañá, 05
- Tehuilopec, Guerrero: Halse, 95a
- Topia mining camp, Durango: Graham (T C), 08
- Zacatecas: Flores, 06a; Rice (C T), 08e; Concepción del Oro district: Chase (T), 09; Veta grande: Burkart, 33
- Zacualpán district: Platt, 09a; Villafañá, 09; Villarello, 06
- Silver and copper deposits: Balarezo, 09
- Silver, copper, and lead ores at Veta Rica mine, Sierra Mojada Coahuila: Van Horn (F R), 11a, 12
- Sinaloa: Merrill (F J H), 06c; Weed, 02c northern: Tays, 09
- San José de Gracia: Tays, 09a
- Sivirioja district: Tays, 10a
- Soda deposits, Lake Texcoco: Flores, 18

## Mexico—Continued.

*Economic geology*—Continued.

- Sodium carbonate, Sonora: Blake (W P), 98e
- Sonora: Dumble, 00a; Guillemin Tarayre, 67a; Merrill (F J H), 05c; Tovote, 18; Weed, 02c
- Elisa mine: Lee (M L), 12
- El Tigre mine: Herrick (R L), 09a
- erosion and oxidation: Merrill (F J H), 07e
- heretical vein types: Merrill (F J H), 07a
- La Colorado, graphite: Hess, 09c
- Las Chispas mines: Russell (B E), 08a
- mineral resources: Merrill (F J H), 08a
- Nacozari district, Los Pilaes mine: De Kalb, 10a
- Sahuaripa district: Nelson (C N), 06
- Sonora Valley mines: Hafer, 12
- surface enrichment in: Merrill (F J H), 08b
- Structural materials: Tello, 17
- Sulphides, relation to water level in Mexico: Lucke, 18
- Sulphur: Castillo, 69
- Durango: Rangel, 11; Villarello, 07a
- Sierra de Banderas: Böse, 06c
- Sultepec district, Toluca: Dollfus, 67d; Malacate mines: Halse, 94b
- Tabasco: Laguerrene, 02
- Tamazula, Jalisco: Híjar, 05
- Tasco district, Guerrero: Chism, 89
- Tetela del Oro, Puebla: Honigmann, 16
- Teziutlán, Puebla: Gómez, 16a
- Tin: Halse, 00a; Ingalls, 98; Anon, 17
- Durango: Hanks, 76; Ingalls, 96; Rangel, 11
- Sain Alto, Zacatecas: Halse, 00a; Kempton, 96; Nevius, 03
- Sierra de Guanajuato: Wittich (E), 10d, k
- Tlalpujahua district, Michoacán: Burkart, 69; González, 10
- Toluca, Almoloya y Lerma, peat: Alcalá, 06
- Topia mining camp, Durango: Graham (T C), 08
- Trinidad y Anexas mineral region: Carranco, 07
- Tungsten, Lower California: Whitney, 67b
- Vallecillo mines, Nuevo León: Chism, 85
- Vanadium, Charcas, San Luis Potosí: Cabañero, 03a
- Veins, ore-bearing, structure: Halse, 02
- Velardeña district: Fogh, 94; Spurr, 08a
- Vera Cruz, Zomelahuacan district: Fishback, 10a
- Veta grande, Zacatecas: Burkart, 33, 33b, 35a
- Veta Madre: Rickard (T A), 07b
- Villa Aldama, Nuevo Leon: Martínez Baca, 92
- West coast: Botsford, 10
- Yaqui River country, Sonora: Bancroft (G J), 03
- Yasca, Tepic: Waitz, 12b
- Zacatecas: Amador, 00; Botsford, 09a; Bustamente, 34; Flores, 06a; Posselt, 50; Rath, 86f
- Concepción del Oro district: Chase (T), 09
- El Magistral district: Villafañá, 17
- Sierras de Mazapil y Concepción del Oro, phosphates: Burkhardt, 07
- Zacualpan: Ramírez, 82h; Villarello, 06; Coronas y anexas mines: Villafañá, 09



## Mexico—Continued.

*Economic geology*—Continued.

- Zimapan, Hidalgo, jamesonite deposit: Lindgren, 14b  
 Zinc, Boquillas, Coahuila: Moser, 11  
 Chihuahua: Wornester, 07  
 Diente: McCormick, 07  
 Las Plomosas: Burrows (R H), 09, 10a  
 Durango: Rangel, 11  
 Santa Bárbara: Rice (C T), 08c  
 San Ygnacio mine: Peragallo, 09  
 Zopilote, Tepic: Ordóñez, 94c

*Historical geology*.

- Acambay-Tixmadeje: Urbina, 13  
 Aguascalientes: Bárcena, 76  
 Altar district, Sonora: Bonillas, 11a  
 Ameca de Jalisco Valley: Bárcena, 75d  
 Archean rocks: Ordóñez, 05f; Cañón de Tomelín: Ordóñez, 06c; Anon, 10  
 Atotonilco el Grande, Hidalgo: Wittich, 14c  
 Cadereyta Méndez, Querétaro: Villarello, 04c  
 Calamahi, Lower California: Martínez Baca, 87  
 Calcareous tufa, Valley of Mexico: Ordóñez, 91a  
 Cananea district, Sonora: Hill (R T), 03b; Lee (M L), 12  
 Caprina limestone: Boehm, 98  
 Carboniferous, Huauchinango, Puebla: Ramírez, 82i  
 Cerro del Mercado, Durango: Chrustchoff, 78; Farrington, 04; Weidner, 77  
 Cerro de Muleros pres ciudad Juárez: Böse, 06d  
 Chiapas: Sapper, 94c; and Tabasco: Böse, 05; Sapper, 96a  
 Chihuahua: Kimball, 69  
   geologic map: Hill (R T), 07d  
   Guaynopita district: Hovey, 06k  
   Las Plomosas district: Burrows (R H), 10a  
 Chilpancingo, Guerrero: Ordóñez, 99b  
 Christo district: Gerolt, 26  
 Ciénega: Galvez, 18b  
 Coahuila: Haarman, 13; gisements carbonifères: Aguilera, 06b  
 Coalcoman: Anda, 83  
 Cretaceous: Heilprin, 91a; Hill (R T), 93d  
   Chihuahua: Kimball, 70  
   Coahuila: Böse, 13  
   Colima: Angermann, 07a  
   Durango: Böse, 10a, b; Mapimi: Angermann, 07b; San Pedro de Gallo: Angermann, 07; Burckhardt, 10a  
   northern Mexico: White (C A), 90  
   Obispo Canyon, Sonora: Dumble, 01  
 Cretaceous and Tertiary, eastern Mexico: De Golyer, 15b  
 Cuenca de México: Ordóñez, 95  
 Devonian, Coahuila: Haack, 14  
 Durango: Buelna, 94a; Farrington, 04  
 Eugene history, coastal area: Dumble, 15c  
 Fresno region, Zacatecas: Arenas, 49, 83; Silliman (jr), 83; Velásquez (M), 50  
 Furbero oil field: De Golyer, 15a  
 Geologic map: Aguilera, 94; Castillo, 89a, 93  
 Glaciation in Sonora: McGee, 06; Merrill (F J H), 06a  
 General: Aguilera, 93, 94, 97c, d, 00; Bain, 97; Bárcena, 81; Burkart, 26, 36; Díaz Barriga, 05; Dollfus, 67b; Felix, 92; Gerolt, 64; Hill (R T), 01b; Ordóñez, 97; Pohlig, 88; Virlet d'Aoust, 66

## Mexico—Continued.

*Historical geology*—Continued.

- Guanajuato district: Botsford, 09, 10a; Hill (R T), 04  
 Guerrero: Paredes, 18  
 Hidalgo: Bárcena, 77b; Tulancingo: Gálvez, 16  
 Huasteca region, Vera Cruz: Kimball, 76  
 Huauchinango: Ramírez, 82i  
 Iguala-San Miguel Totolapa, Guerrero: Hall (C E), 03  
 Intrusions, recent: Philippi, 07  
 Isthmus of Tehuantepec: Hartley, 17  
 Jalapa: Galeotti, 39; Ramírez, 82e  
 Jalisco: Bárcena, 91, 92; Villafañá, 16; Tecalitlán: Paredes, 16  
 Jurassic: Böse, 98; Burckhardt, 15; Nikitin, 90  
 Jurassic and Cretaceous of Durango: Burckhardt, 10, 12  
 Lerma River, Mexico: Tello, 16  
 Loup Fork Miocene, Hidalgo and Vera Cruz: Cope, 85q  
 Lower California: Emmons (S F), 94b; Gabb, 82; Heim, 15, 16; Lindgren, 91; Merrill (G P), 97a; Ramos, 87; Wittich (E), 09  
   Boleo: Fuchs, 86  
   La Paz: Angermann, 04  
   Magdalena Bay: Gálvez, 18  
   Ojo de Liebre: Wittich, 16  
   southern part: Heim, 15  
   Todos Santos Bay region: Lindgren, 89  
 Mesozoic: Bárcena, 75b  
 Mexico, Valley of: Villada, 04  
 Mexico (state), geologic map: Gerolt, 27d  
 Mexico and Toluca valleys, geologic map: Villada, 91  
 Mexico to Puebla: Velásquez de León, 50  
 Mezquital del Oro, Zacatecas: Ordóñez, 94b  
 Michoacán: Burkart, 32  
   Coalcoman: Urquiza, 82  
   Huetamo: Ramírez, 82d  
 Mixteca Alta, Jurassic: Wieland, 13  
 Monterey, Nuevo León: Wittman, 05  
 Monterey et Saltillo: Böse, 06f  
 Morelos, Tetecala: Ramírez, 82c  
 Nauhcampatepetl (Cofre de Perote): Ordóñez, 05c  
 Northern Mex.: Rémond, 66  
 Nummulite beds: Felix, 95a  
 Oaxaca: Felix, 90; Sapper, 94; Smith (A H), 05  
 oil fields: Huntley, 15  
 Orizaba: Saussure, 58a  
 Orizaba district, Vera Cruz: Böse, 99; Saussure, 58a; Scovell, 93  
 Outline of geology: Aguilera, 07  
 Pachuca district, Hidalgo: Aguilera, 97e; Ordóñez, 98c  
 Paleozoic, Sonora: Angermann, 04a; Merrill (F J H), 06d  
 Parral district, Chihuahua: Scalia, 17; Waitz, 06c  
 Parras: Böse, 06e  
 Permian, Coahuila: Haack, 14  
 Petroleum fields, northeastern Mexico: Garfias, 15  
 Petroleum regions: Villarello, 08  
 Pico de Teira, Zacatecas: Ordóñez, 92



## Mexico—Continued.

*Historical geology*—Continued.

- Popocatepetl: Aguilera, 95; Gerolt, 64a; section: Dollfus, 67a  
 Post-Pliocene deposits, Papaloapam district; Wittich, 12b  
 Puebla: Felix, 91  
   Matamoros Izúcar, Chiautla, and Acatlán: Ramírez, 82  
   San Juan Raya: Villada, 05  
 Quaternary: Burkart, 68  
 Querétaro: Villarello, 05d  
 Ramos and Catorze, San Luis Potosí: Burkart, 31  
 Real del Monte, Hidalgo: Burkart, 57a; Ordóñez, 99  
 Rhyolites: Ordóñez, 00a  
 Río Grande region, Coahuila: Schmitz, 85; Schott, 55  
 Río Nazas region: Burekhardt, 09  
 Rioverde y Arroyo Seco region: Paredes, 09a  
 Sabinas coal field, Coahuila: Tuttle, 94  
 Sahuayacan district, Chihuahua: Treadwell, 05  
 San Andrés, Michoacán: Saussure, 58  
 San José del Oro: Galeotti, 38b  
 San José district, Tamaulipas: Finlay (G I), 03a, b, 04  
 San Lorenzo, México: Lazo, 05  
 San Miguel Peras, Oaxaca: Girault, 16  
 San Nicolás del Oro: Ramírez, 75b  
 San Pedro district, San Luis Potosí: Finlay (G I), 03  
 Santa Eulalia district, Chihuahua: Argall, 03; Prescott, 15  
 Santa Rosa, Coahuila: Hill (R T), 92e  
 Sections: Dollfus, 67b  
 Sierra, Guerrero: Laguerenne, 82  
 Sierra de Concepción del Oro: Burekhardt, 06a  
 Sierra de Guadalupe, Mexico: Puga, 88a  
 Sierra de Guanajuato: Monroy, 88; Villarello, 06d, 09g  
 Sierra de Mazapil et Santa Rosa: Burekhardt, 06b  
 Sierra Madre, Vera Cruz: Böse, 01; Brinsmade, 16  
 Sierra Mojada, Coahuila: Chism, 87; Malcolmson, 01; Ramírez, 77b, 80  
 Sierra Rica and trans-Concho country, Chihuahua: Caracristi, 09, 10  
 Sierra Tlayacac, Morelos: Gill, 95  
 Socorro: Grayson, 72  
 Sonora: Angermann, 04a; Dumble, 00a, 01a; Guillemin Tarayre, 67a; Hill (B F), 00  
   Moctezuma region: Aguilera, 88  
   northwestern: Schott, 57b  
   Sahuaripa Valley: Gabb, 64b  
 Sultepec district, Toluca: Dollfus, 67d; Villada, 87  
 Tabasco: Laguerenne, 02; Sapper, 94c  
 Tamaulipas, southern: Ordóñez, 18  
 Tampico embayment area: Dumble, 18  
 Tectonic history: Haarman, 17  
 Tehuacán, Puebla: Aguilera, 02a; Böse, 16a; Castillo, 50  
 Tehuantepec Isthmus: Barroso, 77; Böse, 05; Maqueo, 09  
 Tepetongo region: Schwarz (J), 34

28738°—24—22

## Mexico—Continued.

*Historical geology*—Continued.

- Tequesquipan: Gálvez, 18a  
 Tertiary, correlation: Vaughan, 18d  
   northeastern Mex.: Dumble, 08, 11b, 12a, 15b  
   plateau region: Wittich, 15a  
   Tuxpam: Dickerson, 17d; Dumble, 16  
 Tlahualilo lake region: Paredes, 08  
 Toliman: Galeotti, 38a  
 Tonalongo, Hidalgo: Villada, 10a  
 Tres Marias: Grayson, 72  
 Triassic, marine, in Zacatecas: Amador, 08; Burekhardt, 06d  
 Triassic coal field, Sonora: Dumble, 00  
 Tulancingo, Hidalgo: Villarello, 02  
 Tulitic, Puebla: Ramírez, 82f  
 Valley of Mexico: Chism, 88  
 Velardeña: Fogh, 94  
 Vera Cruz: Puga, 88; Jalacingo, Minas y Tata-tila: Ordóñez, 05b  
 Vera Cruz-Mexico City: Dollfus, 67  
 Veta grande, Zacatecas: Burkart, 33  
 Volcanic rocks, northern Mex.: Ruxton, 50  
 Yucatán: Ordóñez, 02a  
 Yucatán Peninsula: Sapper, 96  
 Zacatecas: Amador, 00; Bustamante, 34  
 Zopilote, Tepic: Ordóñez, 94c  
*Mineralogy.*  
 Alamosite, a new lead silicate: Palache, 09b  
 Anglesite and boleite, Lower California: Genth, 93  
 Apatite: Burkart, 71  
 Apophyllite, Guanajuato: Klein, 84  
 Arsenic, native: Castillo, 73a  
 Asbestiform mineral, Zinapecuaro, Michoacán: Villarello, 04b  
 Barcenite, Huitzeco, Guerrero: Mallet, 78b, 79; Ramírez, 79  
 Berthierite, Lower California: Rammelsberg, 66e  
 Bismuth mineral, San Luis Potosí: Castillo, 74a  
 Boleite, Lower California: Cumenge, 93; Genth, 93  
 Boleo, Lower California: Lacroix, 95  
 Bustamite: Rammelsberg, 66b  
 Calamine, Santa Eulalia, Chihuahua: Seebach, 12  
 Calamine crystals: Pogue, 11  
 Calcites, Guanajuato: Kreutz, 07; Mügge, 97; Pirsson, 91  
 Castellite: Rammelsberg, 66a  
 Catalog: Villada, 96  
 Celestite, Atotonilco: Wittich, 14b  
 Cerusite twins, San Luis Potosí: Hunt (W F), 11  
 Chihuahua: Wittich, 12c  
 Coahuila, Sierra Mojada, Veta Rica mine: Van Horn, 13  
 Contact minerals, Valardeña: Wright (F E), 08e  
 Copper, Inguaran, Michoacán: Cumenge, 93  
 Copper mineral, Mazapil: Del Rio, 46  
 Copper ores: Rammelsberg, 66  
 Corundum, Fresnillo, Zacatecas: Castro, 17  
 Cristobalite, Pachuca: Rath, 87a  
 Cuprodesclowitzite: Rammelsberg, 83; Lower California: Whitney, 67b



## Mexico—Continued.

*Mineralogy*—Continued.

- Datolite, Guanajuato: Farrington, 98  
 Descloizite, Zacatecas: Penfield, 83a  
 Diaphorite, San Luis Potosí: Spencer (L J), 98  
 Distribution of chemical elements in Sierra de Guanajuato: Wittich (E), 10g  
 Domeykite, Chihuahua: Caballero, 03; Paracatas: Burkart, 67, 67a  
 Durangite, Durango: Brush, 69a, 76; Des Cloizeaux, 75; Hanks, 76  
 Enargite: Rammelsberg, 66c  
 Galena, seleniferous: Navia, 77a  
 Garnet, Cuatla, Morelos: Villada, 91a; Jalisco: Villarello, 04  
 Gems and precious stones: Kunz, 07a  
 General: Rath, 84e; Wittich, 18  
 Grahamite, Huasteca: Kimball, 76  
 Graphite, Ejutla, Oaxaca: Villarello, 04d  
 Grossularite, Morelos: Damour, 71; Landero, 91, 91b; Xalostoc: Landero, 91a  
 Guadalcázarite, Guadalcázar: Burkart, 72; Petersen, 72  
 Guanajuatite, Guanajuato: Mallet, 77a, 78  
 Gypsum crystals: Wittich (E), 12a, e  
 Hematite, Guanajuato: McKee, 04  
 Inesite, Durango, Farrington, 00  
 Jalisco: Landero, 84  
 Labradorite: Ford (W E), 10a; Pinacate, Sonora: Bonillas, 10  
 Linarite, Jalisco: Bárcena, 77c  
 List of minerals, systematic and geographic: Aguilera, 98  
 Livingstonite: Bárcena, 79a; Mallet, 79a; Huitzuc, Guerrero: Bárcena, 74b  
 Maguarichic, Rayon district, Chihuahua: Bagg, 05b  
 Mazapilite, Zacatecas: Koenig, 88a, 89a, c; and arseniosiderite, identity: Larsen, 18  
 Medinita: Ramírez, 75a  
 Meteorites: Aguilera, 99; Bárcena, 76a; Burkart, 56a, 58, 66, 70b, 71; Cornejo, 70; Eastman, 92; Fletcher (L), 90a; Häpke, 84; Krantz, 55; Rammelsberg, 69a; Smith (J L), 68; Whitney, 66d  
 Ahumada, Chihuahua: Farrington, 14  
 Arispe, Sonora: Ward (H A), 02a; Wuensch, 03  
 Atemajac, Jalisco: Landero, 97  
 Bacubirito, Sinaloa: Angermann, 04b; Ward (H A), 02  
 Bolsón de Mapimi: Brezina, 81  
 Cacaria, Durango: Cohen, 92  
 Catorco: Kunz, 86f, g, 87b  
 Casas Grandes, El Paso del Norte, Chihuahua: Cohen, 04; Tassin, 02b  
 Chihuahua: Smith (J L), 55  
 Chupaderos, Chihuahua: Cohen, 91, 92  
 catalog: Castillo, 89, 90  
 Coahuila: Huntington, 87, 89; Lupton, 85; Smith (J L), 55, 69a  
 Cuernavaca, Morelos: Cohen, 03; Ward (H A), 02a  
 Descubridora: Burkart, 74; Zérega, 75  
 Durango: Agraz, 09  
 Formatlán, Jalisco: Shepard, 85a  
 iron: Ordóñez, 90

## Mexico—Continued.

*Mineralogy*—Continued.

- Meteorites: Jiquipilco, Toluca: Nöggerath, 26  
 La Belle Roca, Durango: Whitfield (J E), 89  
 Mazapil, Zacatecas: Hidden, 87, 87b  
 Mezquital, Durango: Cohen, 92  
 Misteca, Oaxaca: Cohen, 92  
 Ranchito, Sinaloa: Cohen, 04  
 Rodeo, Durango: Farrington, 05  
 San Gregorio, Chihuahua: Frenzel (A), 98; Smith (J L), 71a  
 Santa Rosa, Coahuila: Cohen, 92; Shepard, 66c  
 Toluca: Cohen, 91, 92; Krantz, 57; Reichenbach, 57; Tschermak, 09; Wöhler, 56  
 Xiquipilco: Taylor (W J), 56  
 Yanhuatlán: Castillo 65; Río de la Loza, 65, 65a  
 Zacatecas: Burkart, 59; Cohen, 92  
 Miargyrite, Zacatecas: Eakle, 99  
 Mimetesite, Chihuahua: Paul, 12  
 Minerals, crystallography: Ungemach, 10  
 Minerals from cave near Chihuahua: Hovey, 12b  
 Minerals of Maguarichic: Bagg, 05b  
 Naica: Dégoutin, 12  
 Opal: Burkart, 74b  
 Pearceite, Sierra Mojada, Coahuila: Van Horn (F R), 11, 11b  
 Platinum minerals, Jacala: Bárcena, 74  
 Polybasite, Guanajuato: Prior, 90  
 Precious stones, Lower California: Wittich, 14  
 Prehnite, Guanajuato: Hlawatsch, 10  
 Pseudomorphs after stibnite, San Luis Potosí: Ford (W E), 12a  
 Ramirite, San Luis Potosí: Velázquez de León, 85  
 Ramosite, San Luis Potosí: Perry (N W), 84  
 Raspite, Guanajuato district: Wittich (E), 11a  
 San Nicolás del Oro: Laguerenne, 75  
 Sierra de Guanajuato: Wittich (E), 10, 10e  
 Silicates from Veta Madre, Guanajuato: Wittich (E), 11  
 Silver pseudomorph, Guanajuato: Navia, 74  
 Smaltite, Zapotlán, Jalisco: Navia, 77  
 Stephanite: Rath, 84b; crystals, Arizpe, Sonora: Ford (W E), 03  
 Stromeyerite, Zacatecas: Koenig, 86  
 Sulpho-bismuthite, Chihuahua: Foster (E L), 85a  
 Sundry minerals: Burkart, 66a, 75; Genth, 87; Ungemach, 10  
 Tapalpite, Durango: López Monroy, 69  
 Taxco de Alarcón, Guerrero: Salazar, 01  
 Tellurium-bismuth-silver ore: Rammelsberg, 69  
 Topaz: Wittich, 12d; San Luis Potosí and Durango: Bücking, 87  
 Torreon, Chihuahua: Collins (H F), 92  
 Tridymite, Pachuca: Rath, 68, 68a, 74  
 Vanadium mineral, San Luis Potosí: Velásquez, 84  
 Wad, oolitic: Bárcena, 74d  
 Wollastonite rock mass, Chiapas: Collins (H F), 03  
 Xonalite: Rammelsberg, 66b  
 Zeolites, Lower California: Ritter, 95  
 Zoisite, Lower California: Farrington, 06a



## Mexico—Continued.

*Paleontology.*

- Ammonites, Jurassic: Pohlig, 85  
 Ammonites James-Danae: Bárcena, 79b  
 Apalachicola fauna, Lower California: Arnold, 17b  
 Aviculidae, Triassic, Zacatecas: Frech, 07a  
 Bacillaria, Mexico: Ehrenberg, 69  
 Brachyostrea, new genus of glyptodonts: Brown (B), 12c  
 Caprina limestone: Boehm, 98, 99  
 Carnivora, Pliocene and Post-Pliocene: Freudenberg, 10  
 Catalog of National Museum: Villada, 97  
 Cerro de Muleros: Böse, 10  
 Cretaceous: Aguilera, 09a; Felix, 90, 91a; Heilprin, 91a  
 Chihuahua: Gabb, 72b  
 Coahuila: Böse, 13  
 Cycads: Wieland, 10a  
 Dasycladaceae, Cerro Escamela: Steinmann, 99  
 Devonian, Coahuila: Haack, 14  
 Diatoms: Díaz Lozano, 17  
 Echinoidea, Cretaceous: Cotteau, 90  
 Elephas: Edwards (H M), 67; Weber, 67  
 Chihuahua: Diffenderfer, 73  
 Zacualco: Edwards, 65  
 Equidae: Owen (R), 69  
 Valley of Mexico: Owen (R), 70  
 Vera Cruz: Cope, 86a  
 Felis: Dugès, 94  
 Flora, Valley of Mexico: Villada, 03a  
 Flora liásica, Mixteca Alta: Wieland, 13, 14a  
 General: Bárcena, 77, 77a  
 Glyptodon, Oaxaca: Felix, 93; Zumpango: Cuatáparo, 75; Jalisco: Brown (B), 12  
 Human remains, Mexico: Bárcena, 85, 86a,b,c; Castillo, 85a; Newberry, 86g  
 Jurassic: Felix, 90, 91a  
 Durango: Johnson (D W), 02a  
 Mazapil: Burckhardt, 06c  
 Sierra de Catorce, San Luis Potosí: Castillo, 95  
 Tehuacan: Nyst, 40  
 upper, fauna, Russian boreal types in: Burckhardt, 11, 11a  
 Jurassic and Cretaceous faunas, San Pedro del Gallo: Burckhardt, 12  
 Llama, Tequixquiac: Bárcena, 82a  
 Mammalia, Valley of Mexico: Castillo, 69a; Cope, 84h; Villada, 03, 10  
 Mastodon: Roemer, 87  
 Mastodon humboldtii, northern Mex.: Eaton (G F), 05  
 Megatherium: Dugès, 97  
 Mesozoic: Bárcena, 75b  
 Michoacán, Coalcoman: Urquiza, 82  
 Miocene, Zuluzum, Chiapas: Engerrand, 10  
 Mollusca, boreal types in Jurassic: Burckhardt, 12a  
 Oaxaca: Felix, 90, 93  
 Orbitoides, Lower California: Douvillé, 15a  
 Palauchenia, Mexico Valley: Owen (R), 70a  
 Permian, Coahuila: Haack, 14  
 Phytolitharia, Toluca Valley: Ehrenberg, 66  
 Plant remains in basalt: Solórzano, 07  
 Plantae, Liassic, Huauchinango, Puebla: Díaz Lozano, 16; Huayacocotla, Vera Cruz: Díaz Lozano, 16

## Mexico—Continued.

*Paleontology—Continued.*

- Platygonus: Dugès, 87  
 Pleistocene, Lower California: Böse, 07  
 Pleistocene Mollusca, Magdalena Bay, Lower California: Dall, 18a  
 Plesiosaurus (Polyptychodon) mexicanus: Wieland, 10b  
 Pliocene, Tehuantepec: Toula, 11  
 Tuxtepec, Oaxaca: Böse, 05a, 09  
 Vera Cruz: Böse, 06i  
 Puebla: Felix, 91; San Juan Raya: Villada, 05  
 Russian boreal types: Burckhardt, 11, 11a  
 Santa María Tatetla: Villada, 10c  
 Selachians, Tertiary, Lower California: Wittich, 14a  
 Senonian Mollusca, Cardenas: Böse, 06a  
 Sierra Mojada, Coahuila: Ramírez, 80  
 Sonora, Sahuaripa Valley: Gabb, 64b  
 Spheroma, crustacean: Bárcena, 75d  
 Styliina, Guadalcázar, San Luis Potosí: Gregory (J W), 99a  
 Tertiary: Böse, 06  
 northeastern Mex.: Dickerson, 17  
 Tehuantepec: Böse, 10c  
 Tuxpam: Dickerson, 17d  
 Triassic, Zacatecas: Burckhardt, 05  
 Triassic plants, Sonora: Humphreys (E W), 16a  
 Tylostoma, Puebla: White (C A), 81f  
 Vallée de Oaxaca: Conzatti, 08  
 Williamsonsias of Mixteca Alta: Wieland, 09b  
*Petrology.*  
 Altar district, Sonora: Bonillas, 11a  
 Andesite, Toluca: Rath, 75  
 Aplite-pegmatite dikes near Silao, Guanajuato: Wittich (E), 10a,i  
 Basalt, Sierra Verde: Kroustchoff, 85a  
 Calendaria Azteca rock: Ordóñez, 93  
 Catalog of rocks: Méx I G, 14a  
 Ceboruco Volcano: Ordóñez, 94a  
 Cerro de las Navajos: Tenne, 85  
 Cerro del Mercado, Durango: Chrustschoff, 78  
 Chiapas and Tabasco: Ordóñez, 05  
 Coahuila and Nuevo León: Cross, 93  
 Collection of National Museum: Villada, 99  
 Contact deposits of Harpers, near Silao, Guanajuato: Wittich (E), 10b  
 Cuenca de México: Ordóñez, 95  
 Dolomite, Uruapán: Herrera, 90  
 Durango: Farrington, 04  
 Eruptive rocks: Farrington, 97b; Ordóñez, 97a  
 Eruptive rocks, central Mex.: Guild, 06; San Pedro del Gallo, Durango: Waitz, 10  
 General: Aguilera, 09b; Burkart, 36; Villada, 99  
 Granodiorite, Concepción del Oro, Zacatecas: Bergeat, 09  
 Guanajuato, volcanic ash: Wittich (E), 10f  
 Guerrero: Bonillas, 18  
 Jorullo: Villafañá, 07  
 Lower California: Lindgren, 91  
 eruptive rocks: Ritter, 95a  
 Todos Santos Bay: Lindgren, 90  
 Nepheline syenite, Tamaulipas: Finlay (G I), 00  
 Oaxaca: Felix, 90  
 Obsidian: Ordóñez, 92a  
 Origin of certain rocks: Bárcena, 82



## Mexico—Continued.

*Petrology*—Continued.

- Orizaba, eruptives: Ordóñez, 99a  
 Pachuca district, Hidalgo: Aguilera, 97c;  
 Ordóñez, 97b  
 Pedregal de San Ángel, Mexico: Ordóñez, 91  
 Parral: Waitz, 06c  
 Porphyry, Cenozoic: Bárcena, 73b  
 Puebla: Hoppe, 99  
 Real del Monte: Burkart, 57a  
 Rhyolites: Ordóñez, 00a  
 Roca verde de Zacatecas: Rosenbusch, 06  
 Río Verde region, Oaxaca: Waitz, 12  
 San José district, Tamaulipas: Finlay (G I),  
 03a, 04  
 Santa María volcano, ashes: Ordóñez, 04b  
 Sierra de Concepción del Oro: Rosenbusch, 06a  
 Sierra de Mazapil: Rosenbusch, 06b  
 Sinaloa, Sinaloa: Ordóñez, 97c  
 Spherulites: Bárcena, 75c  
 Tuff, Toluca Valley: Ehrenberg, 66  
 Tulancingo, Hidalgo: Villarello, 02  
 Volcanoes, Colima: Chrustschoff, 86

*Physical geology*.

- Cave, Atoyac: Allorge, 08  
 Cacahuamilpa, Guerrero: Flores, 10; Urbina,  
 09a; Villada, 88a  
 Cuernavaca: Phillips (J), 42  
 Ojo de Agua: Villada, 88  
 Pedregal San Ángel, in lava: Wittich, 16d  
 Tzinacamostoc, Puebla: Haarman, 11  
 Central plateau, origin, Böse, 09  
 Changes of level, Lower California: Wittich, 14a  
 Chiapas and Tabasco: Böse, 05  
 Desert phenomena, San Luis Potosi: Wittich,  
 18a  
 Dike, mineralized, Sahuaripa, Sonora: Brown  
 (R G), 97a  
 Earthquakes: Adorno, 64; Aguilar, 91; Perrey,  
 50; Ramírez, 73  
 Acambay-Tixmadeje, Mexico: Urbina, 13  
 catalog: Mex I G, 11; 1904-1908: Aguilera, 09;  
 in 1909: Mex I G, 09  
 Guadalajara: Ordóñez, 12, 12a  
 Guerrero, cause: Böse, 11  
 Jalisco: Bárcena, 75a; Iglesias, 77; Matute, 75  
 Sonora: MacDonald (B), 18; Goodfellow, 87;  
 1887: Aguilera, 88; May 3: Hunt, 87d  
 Volcano Lake: Anon, 16b  
 Zanatepec, Oaxaca: Böse, 03  
 1866, January: Sartorius, 67  
 1879, May 17: Bárcena, 79  
 1887, May: Puga, 87  
 1890, December 2: Puga, 91  
 1902, January, Guerrero: Böse, 04  
 1907, April 14: Böse, 08; Marvin, 07a  
 1908: Miranda y Marrón, 09  
 1911, June 7: Miranda y Marrón, 12  
 1912, November 12: Montessus de Ballore, 17  
 Earthquake diagrams: Camacho, 10  
 Earthquake regions: Böse, 02  
 Effect of earthquake on deep underground  
 water circulation: Yeandle, 09  
 Eolian deposits: Virlet d'Aoust, 58a  
 Explosion canals in lava: Waitz, 11  
 Fault system of eastern Santa Eulalia: Knapp  
 (M A), 06

## Mexico—Continued.

*Physical geology*—Continued.

- Fault zone in Valley of Mexico: Böse, 09a  
 Folding of rock strata: Nason, 09  
 General: Virlet d'Aoust, 58  
 Geysers, Michoacán: Villada, 90  
 Intrusions, recent: Philippi, 07  
 Ixtaccihuatl, glaciers: Ordóñez, 94  
 Ixtlán, geysers: Waitz, 06a  
 Lower California, changes of level: Wittich (E),  
 12  
 Mexican plateau, tectonic history: Hill (R T),  
 07  
 Michoacán geyser region: Caballero, 05a  
 Microseisms of 1911: Mex I G, 12  
 Oil field temperatures: DeGolyer, 18a  
 Oolites, formation: Cayeux, 07a; Virlet d'Aoust,  
 57  
 Petroleum, mode of accumulation: Garfias, 12  
 Plication, Cananea: Blake (W P), 04c  
 San Andrés, Michoacán: Saussure, 58; post-  
 paroxysmic phenomena: Waitz 06  
 Seismic Mex.: Montessus de Ballore, 92  
 Seismic movements, 1911: Mex I G, 13a; 1912:  
 Mex I G, 14  
 Seismic movements and lunar culminations:  
 Montessus de Ballore, 90  
 Seismograms, interpretation: Camacho, 10  
 Seismology in Mex.: Muñoz Lumbier, 18  
 Soda deposits of lakes: Virlet d'Aoust, 65  
 Sun spots, relation to seismic and volcanic phe-  
 nomena: Poey, 74  
 Tectonic history: Haarman, 17  
 Temperature record of borings: Koenigsberger,  
 11  
 Tuxtla: Moziño, 74  
 Valle de Santiago, craters of explosion: Ordóñez  
 06f  
 Volcanic necks, examples of: Ordóñez, 05e  
 Volcanoes: Aguilera, 07a, b; Böse, 00, 02; Brig-  
 ham (W T), 71a; Burkart, 70c; Cadell, 07;  
 Cleland, 07a; Dannenberg, 08; Felix, 90;  
 Hobson, 07a; Humboldt, 54; Inkey, 08;  
 Melgarcio, 10; Ordóñez, 95a; Pieschel, 55,  
 56; Waitz, 15  
 Aguafria and Jaripeo: Ramírez 73  
 Ceboruco, Jalisco: Bárcena, 75; Caravantes,  
 70; Kunhardt (F), 70; Matute, 75; Or-  
 dóñez, 98a; eruption: Iglesias, 77  
 Citlaltapetl (Orizaba): Angermann, 04c;  
 Saussure, 58a  
 Citlaltapetl and Popocatepetl: Keyes, 07e  
 Colima; Bárcena, 87; Chrustschoff, 86; Díaz,  
 07; Dollfus, 67c; Köhler, 06; Ordóñez,  
 98a; Sabatini, 08; Waitz, 06b  
 catalog of eruptions: Arreola, 15  
 eruptions: Arreola, 03; Ishikawa, 04; Kun-  
 hardt, 69; Puga, 90; Sperry, 03; Waitz, 15;  
 1869: Sartorius, 71; 1903, Ordóñez, 03  
 Colima, Toluca, and Popocatepetl: Hovey,  
 07f, 08e  
 craters, types: Sapper, 94a  
 descending clouds: Waitz, 15  
 distribution: Felix, 94; Sapper, 93a  
 Jalisco: Bárcena, 91  
 Jorullo: Burkart, 39; Hobson, 07; Ordóñez,  
 06e; Saussure, 59; Villafañá, 07; eruption;  
 Burkart, 35; 1759: Burkart, 57



## Mexico—Continued.

*Physical geology*—Continued.

- Volcanoes: Nevado de Toluca: Burkart, 27; Dollfus, 67c; Waitz, 10d  
 Popocatepetl: Aguilera, 95; Dollfus, 67a; Gerolt, 64a; Howarth, 96; Packard (A S), 86d; Rath, 84e; fumaroles: Aguilera, 97  
 Popocatepetl and Ixtaccihuatl: Farrington, 97  
 Puebla: Ordóñez, 05d  
 Real del Monte, eruption: Burkart, 57a  
 Santa Catarina: Ordóñez, 95  
 Santa María volcano, ash-covered area, Böse, 04  
 Tacaná, Chiapas: Böse, 02a, 03  
 Tustla, eruption: Burkart, 35  
 Valley of Santiago: Ordóñez, 00b  
 Xico, craters: Ordóñez, 05a  
 Xinantecatl: Ordóñez, 02  
 Zacapu, Michoacán: Ordóñez, 02b

*Physiographic geology*.

- Arid regions, formations: Hill (R T), 07a  
 Cananea district, Sonora: Emmons (S F), 10a  
 Cerro de Muleros: Böse, 10  
 Cerro Mercado: Farrington, 04  
 Changes of level: Spencer (J W), 97  
 Chiapas: Sapper, 94c; and Tabasco: Böse, 05  
 Chilpancingo, Guerrero: Ordóñez, 99b  
 Citlaltapetl (Orizaba): Angermann, 04c; Scovell, 93  
 Delta of Río Colorado: McDougal, 06, 08  
 Durango: Farrington, 04  
 Explosion craters: Darton, 16b  
 General: Aguilera, 98a, 00; Egloffstein, 64; Felix, 90, 92, 02; Hill (R T), 01b, 05d; Hull, 98; Thayer, 16; Virlet d'Aoust, 66; Wilson (H M), 97  
 Geological canals, Tehuantepec: Spencer (J W), 96b  
 Lower California: Heim, 15, 16; Merrill (G P), 97a  
 La Paz: Angermann, 04  
 elevated coast lines: Wittich (E), 10l, 14a  
 submerged coastal valleys: Davidson (G), 97  
 Mesa central, origin: Böse, 99; Wittich, 18b  
 Mexican Plateau, growth and decay: Hill (R T), 08  
 Nauhcampatepetl (Cofre de Perote): Ordóñez, 05c  
 Nevado de Toluca and Jorullo: Hobson, 07  
 Northern Mex.: Hovey, 06d  
 Oaxaca: Sapper, 94  
 Orizaba district, Vera Cruz: Böse, 99; Scovell, 93  
 Papaguería, Sonora: McGee, 97  
 Pico de Teira, Zacatecas: Ordóñez, 92  
 Pit craters: Davis (W M), 07  
 Popocatepetl: Dollfus, 67a  
 Sierra Madre: Böse, 01; Farrington, 04; Hovey, 05i; Ordóñez, 00  
 Sierra Mojada, Coahuila: Ramírez, 80  
 Sonora: McGee, 95a, 97  
 northwestern: Schott, 57b  
 Seriland: McGee, 96  
 Tabasco: Sapper, 94c  
 Tampico embayment area: Dumble, 18  
 Tancitaro, Michoacán: Ordóñez, 10c  
 Tertiary, northeastern Mex.: Dumble, 15b

## Mexico—Continued.

*Physiographic geology*—Continued.

- Valle de Cerritos, San Luis Potosi: Ordóñez, 08  
 Volcanic craters of Puebla: Ordóñez, 06  
 West coast: Botsford, 10  
 Xinantecatl: Flores, 06  
 Yucatán Peninsula: Sapper, 96; Urbina, 09  
*Underground water.*  
 Ahumada, artesian wells: Escobar, 06  
 Amozoc, Puebla: Ordóñez, 04a  
 Cadereyta Méndez, Querétaro: Villarello, 04c  
 Ciénega: Gálvez, 18b  
 Circulation of underground water: Villarello, 10c  
 Coahuila: Villarello, 13  
 Cuitzeo de Abasolo, Guanajuato: Villafaña, 08  
 General: Ordóñez, 95b  
 Geysers of Comanjilla, Guanajuato: Wittich (E), 10c  
 Guerrero, northern: Laguerenne, 98  
 Hidalgo, Tulancingo: Gálvez, 16  
 Hot springs, Michoacán: Villada, 90  
 Ixmiquilpan Valley, Hidalgo: Paredes, 09b  
 Ixtlán, geysers: Waitz, 06a  
 Jalisco, Tecalitlán: Paredes, 16  
 Jiutepec: Villarello, 06c  
 Lower California, Magdalena Bay: Gálvez, 18  
 Mexico (district): Villarello, 11  
 Michoacán, geyser region: Caballero, 05a  
 Patzcuaro: Villarello, 09b  
 Yurecuaro: Paredes, 13  
 Morelos: Laguerenne, 98  
 Pachuca y Real del Monte: Ordóñez, 16  
 Querétaro: Villarello, 05d, 07; Montenegro: Villarello, 09  
 Tehuacán, Puebla: Böse, 16a  
 Tequesquipán: Gálvez, 18a  
 Tlahualilo, Durango: Villarello, 10  
 Valle de Cerritos, San Luis Potosi: Ordóñez, 08  
 Zacatecas district: Villafaña, 12  
 Miami lead-zinc district, Oklahoma: Chapman (T), 12  
 Mica. *See also mica-producing States.*  
 Canada: Cirkel, 04, 05a; Ells, 04b  
 General: Cirkel, 04, 05; Clarke (F W), 85a; Colles, 05; Corkill, 05a; Culin, 16a; Fuller, 99c; Henderson (C H), 93; Holmes, 01; Pratt, 01k; Schaller, 16c; Smith (G O), 06c; Sterrett, 07b  
 Lithia micas: Clarke (F W), 86c  
 Mineralogy and geology: Colles, 05  
 United States: Holmes (J A), 99a, b; Sterrett, 14; U S G S, 83  
 Michigan.  
 Analcite copper boulder, Keweenaw Range: Hovey, 93  
 Ann Arbor quadrangle: Russell (I C), 08  
 Berrien Co.: Winchell (A), 71a  
 Boring, salt well: Fry, 13a  
 General: Bradish, 89; Emmons (S F), 93; Mat-tice, 99; Winchell (A), 70d, 73a  
 Geological survey, reports: Allen (R C), 11, 12b, 14b; Houghton (D), 42, 43, 44; Hubbard (L L), 99; Lane, 00d, 01b, 02, 02j, 03, 05; Rominger, 93; Wadsworth, 93; Winchell (A), 71; Wright (C E), 93  
 Geothermal gradient: Lane, 00b



## Michigan—Continued.

- Historical review: Lane, 04b  
 Ingham Co.: Douglass, 39  
 Isle Royale: Dickenson, 49; McIntyre, 49  
 Lake Superior region: Locke, 55; Whitney, 55; Winchell (H V), 94  
 Magnetic phenomena around deep borings: Lane, 04a  
 Monroe Co.: Hubbard (B), 39  
 Muskegon Co.: McLouth, 02  
 Porcupine Mountains: Wright (F E), 05a  
 Saginaw Valley: Hubbard (B), 81  
 Shaft of Detroit Salt Company: Fay, 11  
 Soils: Lane, 08a; Winchell (A), 65c  
 Southern Peninsula, northern part: Douglass, 40, 41; southern part: Hubbard (B), 40  
 Supposed fossil from copper-bearing rocks of Lake Superior: Wadsworth, 86  
 Tuscola Co.: Davis (C A), 09c  
 Upper Peninsula: Jackson, 47, 55; Wright (C E), 79  
 Washtenaw Co.: Winchell (A), 81a  
 Wayne Co.: Hubbard (B), 39

*Economic geology.*

- Ann Arbor quadrangle: Russell (I C), 08  
 Arenac Co.: Gregory (W M), 02, 12  
 Asphalt, Delta Co.: Lane, 02l  
 Bay Co.: Cooper (W F), 06  
 Bogline, origin: Lane, 03a  
 Borings for oil and gas: Lane, 05f  
 Building stone: Lane, 04e  
 Cascade iron range: McDonald (P B), 12  
 Cement materials: Allen (R C), 12; Eckel, 13; Hale (D J), 03; Russell, 02  
 Cheboygan region: Winchell (N H), 75a  
 Coal: Allen (R C), 12; Fraser, 07; Holmes (C), 99; Lane, 99d, 00c, 02g, h; Rominger, 76; Smith (R A), 12, 15; Bay Co.: Cooper (W F), 05a, 06; Tuscola Co.: Cooper (W F), 09  
 Clay: Fall, 01, 03; Ries, 00a  
 Copper, Lake Superior region: Ackermann, 76; Allen (R C), 12; Bauerman, 66; Bell (W H), 44; Blandy, 73; Borie, 60; Brinsmade, 10; Broughton, 63; Callender, 54; Clarke (R E), 53; Corey, 06; Credner, 69a; 70b; Deroux, 61; Douglas, 74; Duparc, 00; Dupee, 56; Egleston, 79, 79a; Foster, 50a; Giroux, 06; Henwood, 71a; Hodge, (J T), 50; Hopper, 16; Hore, 09, 12b, e, 14, 15; Houghton (D), 34, 41, 41a; Houghton (J), 79; Hubbard (L L), 12, 12a; Irving, 83b, c; Jackson, 45c, f, g, 46a, e, 49, 49a, b, 50, 56, 69a; Joy, 65; Lane, 04c, 06, 07a, b, 09e, 11, 12a; Macfarlane, 67; Meads, 00; Meuche, 11; Mosler, 77; Müller, 57; Nöggerath, 48; Odendall, 09; Pettit, 47; Phelps, 92; Piggot, 58a; Posselt, 56; Pumpelly, 71, 73b, 78; Read, 15; Rice (C T), 12; Rickard, 05; Rivot, 55, 55a, 56 56a; Rogers (H D), 46b; Rominger, 95; Ruggles, 45; Schooncraft, 21a, 22, 22c, 23; Shepherd, 47; Smyth (H L), 96; Spencer, (J W), 76a; Sperr, 12; Stevens (H J), 05, 07; Wadsworth, 80, 90, 93a, 96, 98a; Weed, 06; Whitney, 50; Whittlesey, 46, 63; Williams (C P), 62

## Michigan—Continued.

*Economic geology—Continued.*

- Copper: Isle Royale: Lane, 98  
 native, origin: Blandy, 00  
 Portage Lake: Macfarlane, 66b  
 Crystal Falls district: Van Hise, 01  
 Detroit district: Sherzer, 17  
 Foundry sands: Ries, 08a  
 General: Houghton (D), 38, 39, 40; Lane, 02b, 03, 05; Mattice, 99; Winchell (A), 71  
 Gogebic iron range, dikes: Boss, 98  
 Gold: Allen (R C), 12; Courtis, 07  
 Ishpeming district: Parker (R A), 88  
 Lake Superior region: Wadsworth, 93a  
 Grand Traverse region: Winchell (A), 66  
 Gypsum: Allen (R C), 12; Diehl, 04; Grimsley, 04, 04a, 05; Smith (R A), 12a; Origin: Grimsley, 04c  
 Huron Co.: Lane, 00  
 Ingham Co.: Douglass, 39  
 Iron: Allen (R C), 12, 12a, 14a; Lane, 09c, 10a; Merritt, 92; Putnam, 86  
 Cascade range: McDonald (P B), 12  
 Crystal Falls district: Clements, 99; Ives, 15  
 Gogebic range: Leith, 03c; Winchell (N H), 88b; Anon, 87a  
 Iron Mountain: Browne (D H), 89  
 Lake Superior region: Brinsmade, 08g; Brooks, 73; Credner, 69; Crowell & Murray, 11; Foster, 51, 65; Geijer, 14; Grant (U S), 04; Macco, 04; McDonald (P B), 13a; Parker (R A), 93; Pumpelly, 76; Rivot, 56a; Rominger, 95; Rose, 04; Sauvage, 75; Van Hise, 92b, 01; Wadsworth, 80, 93a; White (P), 86; Whitney, 50; Wright (C E), 76, 79  
 Marquette district: Kimball, 65; Rominger, 81; Shumway, 81; Van Hise, 92a, 95, 97, 11; Wadsworth, 80c, 90  
 Marquette Range: Jopling, 98; Stoek, 09a; White (E E), 16; Winchell (N H), 88b  
 Menominee district: Bayley, 04; Fulton (J), 87; Hulst, 93; Rominger, 81a; Van Hise, 00, 11; Chapin mine: Larson, 87  
 Newport mine, Ironwood: Vallat, 11  
 Penoque region: Irving, 90  
 Penoque-Gogebic region: Van Hise, 89  
 Iron mines and their mine waters: Lane, 09c, 10a  
 Iron-ore reserves: Leith, 12b  
 Iron River district: Allen (R C), 10; Whittlesey, 77a  
 Isle Royale: Foster, 50a; Lane, 99e  
 Keweenaw district: Wadsworth, 90  
 Keweenaw Point: Foster, 49b  
 Lake Superior region: Burt, 49; E, 58; Eights, 46; Foster, 49, 50b, 51; Gray, 45, 46; Houghton, 46; Hubbard (B), 49; Jackson, 49, 50, 53, 53d, 54; Koch (F K L), 51, 51a, 52; Sanders, 45; Stevens (W H), 54; Stockton, 45; Swineford, 76; Wadsworth, 93a; Whitney, 49; Wright (C E), 76  
 Limestone: Lane, 01, 02c, 05b; Smith (R A), 16  
 Limestone Mountain, Houghton Co.: Case, 15a  
 Lower Peninsula: Lane, 95; Rominger, 76; Winchell (A), 61; northern part: Douglass, 40; Winchell (N H), 75a; southern part: Hubbard (B), 40, 41



## Michigan—Continued.

*Economic geology—Continued.*

Manganese: Harder, 10

Marl: Fall, 01, 03; Hale (D J), 03; Russell, 02; natural history: Davis (C A), 03

Marquette district: Van Hise, 97, 01; Wadsworth, 90

Marquette Range: Jopling, 98; White (E E), 16

Menominee district: Bayley, 04; Van Hise, 01

Menominee iron range, extension eastward: Allen (R C), 14c

Mine waters: Lane, 09c, e

Mineral resources: Allen (R C), 12, 13; Lane, 01d; McCracken, 76; Wright (C E), 79; nonmetallic minerals: Smith (R A), 14a

Monroe Co.: Hubbard (B), 39; Sherzer, 00

Native copper, Lake Superior: Cordier, 49

Natural gas: Allen (R C), 12; Smith (R A), 14

Nonmetallic minerals: Smith (R A), 15

Oil and gas possibilities: Lane, 02d

Peat: Davis (C A), 07

Ann Arbor quadrangle: Russell (I C), 08

Tuscola Co.: Davis (C A), 09c

Penokee-Gogebic district: Van Hise, 01, 11

Petroleum: Allen (R C), 12; Smith (R A), 14; Winchell (A), 65

Port Huron field: Gordon (C H), 02

Saginaw field: Smith (R A), 13

Porcupine Mountains: Wright (F E), 05a

Road materials: Lane, 04e

Salt deposits: Cook (C W), 14

Sanilac Co.: Gordon (C H), 00

Salt: Allen (R C), 12; Cook (C W), 11; Houghton (D), 38, 39a; Lane, 02c; Mich. Legislature, 65; Rominger, 76; Winchell (A), 62a

Shale: Ries, 99a, 00a, g

Silver, Iron River district: Whittlesey, 77a

Lake Superior region: Jackson, 45f, g, 46a; Anon, 53a

native: Schoolcraft, 25

Ontonagon district: Rominger, 76a

Silver Islet vein, Lake Superior: McDermott, 77

Slate, Huron Bay: Rominger, 76a

Stone, Bayport: Benedict, 98

Sulphur: Sherzer, 95

Upper Peninsula: Houghton (D), 41; Hubbard (L L), 01; Jackson, 47; Rominger, 95; Rose, 04; Savicki, 01; Whitney, 47

Wayne Co.: Hubbard (B), 39; Sherzer, 13

*Historical geology.*

Alabaster area: Gregory (W M), 04

Alcona Co.: Lane, 02a

Alpena Co.: Grabau, 01a

Ann Arbor: Winchell (A), 85c

Ann Arbor quadrangle: Russell (I C), 08

Archean, classification: Wadsworth, 92

Arenac Co.: Gregory (W M), 02, 12

Azoic: Whittlesey, 60a

Bay Co.: Cooper (W F), 05

Bayport: Benedict, 98

Black River section: Gordon (W C), 05, 07

Borings: Lane, 02d, 05f

Lower Peninsula: Lane, 95

Manistee region: Fry, 13

Cheboygan region: Winchell (N H), 75a

Cheboygan well log: Alden, 09b

## Michigan—Continued.

*Historical geology—Continued.*

Crystal Falls district: Clements, 99

Detroit district: Nattress, 12a; Sherzer, 17

Detroit River series, age: Stauffer, 16

Devonian: Winchell (N H), 76c; lower: Grabau, 07c

Dikes, granitic, genetic connections of: Lane, 07e

Upper Peninsula: Clements, 99a

Eagle River district, Upper Peninsula: Marvin, 73a

General: Bradish, 89; Houghton (D), 38, 39, 40; Lane, 02d, 05, 05f; McCracken, 76; Smith (R A), 14; Wadsworth, 92b, 93a; Winchell (A), 65, 71, 75; Wright (F E), 05

Geologic map: Allen (R C), 16; Winchell (A), 64d, 76

Geologic section, pre-Ordovician: Lane, 07, 09; from St. Peters up: Lane, 09a

Grand Rapids, Mississippian limestone; Whittemore, 00

Grand Traverse region: Winchell (A), 66

Granite, Ironwood: Winchell (N H), 88h

Gwinn iron district, pre-Cambrian: Allen (R C), 14d

Houghton and Keweenaw cos., correlation: Marvin, 73

Huron Co.: Lane, 00

Huronian: Wichman, 79; Winchell (A), 91a

Huronian volcanics: Van Hise, 93e

Huronian-granite contact: Smyth (H L), 93

Iron River district, geologic map: Allen (R C), 09b

Iron River silver district: Whittlesey, 77a

Isle Royale: Foster, 50a; Lane, 98

Keweenaw Point: Duparc, 00; Hore, 12e; Hubbard (L L), 94, 95, 98; Irving, 85; Jackson, 49b; Lane, 05e, 06; Locke, 46a; Wadsworth, 83c, f, 90, 91; geologic map: Foster (J W), 51; Stevens, 63; Whitney, 53a

Keweenaw series: Irving, 83b; Lane, 11a

Keweenawan and eastern sandstone, relations at Torch Lake: Wadsworth, 85

Keweenawan rocks: Brooks (T B), 76

Keweenawan series, age: Chamberlin (T C), 83d

Lake Superior region: Ackermann, 76; Bauer, 66; Bigsby, 24a; Brooks (T B), 76a; Burt, 46, 49; Campbell (J B), 45; Eggleston, 79, 79a; E, 58; Foster, 49, 49a, c, 50a, b, 51, 51c; Geijer, 14; Gray, 45; Houghton, 46; Hubbard (B), 46, 49; Irvi c Jackson, 49, 50, 53, Koch, 52; Leith, 05a; Pumpelly, 73b; Rivot, 55; Rogers (H D), 46b; Sanders, 45; Spencer (J W), 76a, Van Hise, 91, 93a; Wadsworth, 80, 81e, 93a; Whitney, 49, 49b; Williams (C P), 62; Wright (C E), 79

copper-bearing rocks, age: Brooks (T B), 72; Irving, 83d; Winchell (N H), 88d

iron region: Wright (C E), 76

mineral district, geologic map: Booth, 55; Foster, 51b



## Michigan—Continued.

*Historical geology*—Continued.

- Lake Superior sandstone: Foster, 51g; Jackson, 48b, 54; Rominger, 73; Winchell (N H), 88d; age: Élie de Beaumont, 50; Marcou, 51; Whitney, 60a; Keweenaw Point, position: Agassiz (A), 67
- Lapeer Co., surface formations: Taylor (F B), 02
- Laurentian: Brooks (T B), 80a
- Limestone Mountain, Houghton Co.: Case, 15a
- Limestone regions: Grabau, 03f
- Limestones, southeastern Mich.: Sherzer, 97
- Little Lake district, pre-Cambrian: Allen (R C), 14
- Lower Peninsula: Lane, 95, 99; Rominger, 76; Winchell (A), 61; northern part: Douglass, 41; Winchell (N H), 75a; southern part: Hubbard (B), 41
- Marquette iron region: Rominger, 81; Shumway, 81; Van Hise, 93f, 95, 97, 11; Wadsworth, 90; Williams (G H), 90
- Marshall group: Winchell (A), 62, 68, 69a
- Menominee iron district: Bayley, 00, 04; Rominger, 81a; Van Hise, 11; Williams (G H), 90
- Menominee quadrangle: Van Hise, 00
- Menominee Range: Hulst, 93
- Menominee and Marquette series: Smyth (H L), 94a
- Monroe and Wayne cos.: Nattress, 07
- Monroe Co.: Sherzer, 00
- Monroe formation: Grabau, 10
- Nomenclature of formations, changes in: Lane, 01c
- North shore of lakes Huron and Michigan: Russell, 05a
- Ontonagon district, Lake Superior region: Barnes, 49a; Whitney, 49a
- Ordovician, northern Mich.: Seaman, 94
- Penokee series: Irving, 92
- Penokee-Gogebic district: Van Hise, 11
- Porcupine Mountains: Lane, 09b; geologic map: Wright (F E), 09c
- Portage Lake: Macfarlane, 66b
- Port Huron oil field: Gordon (C H), 02
- Pre-Cambrian, Upper Peninsula: Allen (R C), 15; Credner, 69; Lane, 16; Lawson, 16; Wadsworth, 92b
- Pre-Keweenawan formations, Gogebic range: Allen (R C), 15a
- Presque Isle Co.: Grabau, 01a
- Republic quartzite: Smyth (H L), 94
- Republic trough: Smyth (H L), 97
- Richmond strata, Little Bay de Noquette, northern Mich.: Foerste, 17c
- St. Clair tunnel: Adams (F D), 92
- St. Marys River: Channing, 47
- Sanilac Co.: Gordon (C H), 00
- Silurian, early, Northern Peninsula: Savage, 18 nomenclature and subdivisions: Lane, 09d southern Mich.: Sherzer, 09
- Southeastern Mich.: Fuller, 05o
- South Trap Range, Keweenawan series: Wadsworth, 91a
- Sturgeon River tongue: Bayley, 99
- Sylvania sandrock contour: Nattress, 10

## Michigan—Continued.

*Historical geology*—Continued.

- Sylvania sandstone: Grabau, 07h
- Traverse group: Grabau, 02, 02a
- Tuscola Co.: Cooper (W F), 09
- Upper Peninsula: Houghton (D), 41, 41a; Hubbard (L L), 01; Lane, 05a; Locke, 47; Rose, 04; Savicki, 01; Whitney, 47
- iron and copper regions: Rominger, 95
- iron region: Brooks (T B), 73; Pumpelly, 76
- Paleozoic: Hall, 51b; Rominger, 73
- Washtenaw Co.: Winchell (A), 81a
- Wayne Co.: Sherzer, 13

*Mineralogy*.

- Analcite, Lake Superior: Penfield, 85a
- Calcite, Lake Superior: Palache, 98; Rath, 74a
- Chloritoid: Hobbs, 96; Lane, 91a; Champion: Keller, 91
- Copper, Lake Superior: Rath, 78
- Copper oxide, Copper Harbor, Lake Superior: Whitney, 49d
- Datolite, Lake Superior: Hayes (A A), 61
- Domeykite, Lake Superior: Jackson, 62
- Feldspar, Keweenaw Point: Julien, 99, 00
- General: Lane, 93; Wright (F E), 05
- Grünerite: Lane, 91a
- Jacksonite, Lake Superior region: Whitney, 48b
- Keweenaw Point, Lake Superior: Jackson, 45a
- Keweenawite, Keweenaw Co.: Koenig, 02
- Ledouxite: Richards (J W), 01
- List of macroscopic minerals: Hubbard (L L), 93
- Meteorite, Allegan: Merrill (G P), 99a, 00; Ward (H L), 99a
- Grand Rapids: Eastman, 84; Riggs, 85, 87a
- Reed City: Preston (H L), 03
- Mirabilite, Houghton: Lane, 17b; Peck (A B), 17
- Mohawkite, Keweenaw: Koenig, 01a
- Monroe Co.: Sherzer, 00
- Pitchstone, Isle Royale: Jackson, 51
- Powellite, Houghton Co.: Koenig, 93; Palache, 99
- Riebeckite: Lane, 91a
- Sulphur and celestite, Maybee: Kraus, 06c
- Sulphur deposits, Woolmuth quarry: Kraus, 05c
- Upper Peninsula: Jackson, 55; Julien, 73
- Vanadium minerals, Lake Superior region: Schaller, 15; Teschemacher, 51

*Paleontology*.

- Anthozoa: Rominger, 76b
- Blastoidea, Hamilton group: Barris, 83, 84
- Calamopora: Rominger, 62a
- Carboniferous invertebrates: Stevens (R P), 58
- Cephalopoda, Marshall and Huron groups: Winchell (A), 62
- Crinoidea, Alpena: Barris, 84a
- Devonian, Detroit River series: Stauffer, 18
- Devonic elements in the late Siluric fauna of southern Mich.: Grabau, 08d
- Dundee limestone fauna: Grabau, 13c
- Grand Traverse region: Winchell (A), 66
- Heteroschisma, Alpena: Wachsmuth, 84a
- Huron fauna: Winchell (A), 62b
- Lake Superior sandstone: Winchell (A), 64



## Michigan—Continued.

*Paleontology*—Continued.

- Marshall fauna: Winchell (A), 62b, 65b, 71b  
 Marshall and Coldwater beds: Lane, 00a  
 Mastodon, Lenawee Co.: Winchell (A), 64a;  
     Terre Coupie: Warren (J C), 55  
 Megistocrinus, Alpena: Wachsmuth, 84  
 Mississippian, Grand Rapids: Strong, 72  
 Monroe Co.: Sherzer, 00  
 Organic markings, Lake Superior iron ores:  
     Gresley, 96b  
 Organic remains, Huronian (?) series, Iron  
     Mountain: Gresley, 97; in iron-bearing  
     rocks: Cayeux, 11  
 Platygonus: Wagner, 03  
 Postglacial Mollusca, Emmet Co.: Baker  
     (F C), 13a  
 Pleistocene ruminants: Gidley, 08  
 Richmond fauna, Little Bay de Noquette,  
     northern Mich.: Foerste, 17c  
 Schoharief fauna: Grabau, 06c, 08  
 Shells of marls: Walker (B), 03  
 Silurian faunas in southern Mich.: Sherzer, 09  
 Symbos cavifrons: Case, 15c  
 Upper Peninsula, Paleozoic: Hall, 51c

*Petrology*.

- Amygdules, Keweenaw district: Wadsworth,  
     81c  
 Auvergnose rocks: Lane, 06a  
 Celestite-bearing rocks: Kraus, 05  
 Clay slate, Huronian: Wichman, 79  
 Crystal Falls district: Clements, 99  
 Dikes, Marquette: Lane, 03c; Upper Peninsula:  
     Clements, 99a  
 Eagle River district, Upper Peninsula: Mar-  
     vine, 73a  
 Gabbro-diorite aplite: Lane, 09f  
 General: Lane, 93; Wright (F E), 05  
 Igneous rocks, Crystal Falls: Clements, 98  
 Intrusive rocks, Mount Bohemia: Wright  
     (F E), 09b  
 Isle Royale: Lane, 98  
 Keweenaw Point: Hubbard (L L), 98  
 Keweenaw series; Irving, 83b; Lane, 11a  
 Keweenawan lodes: Lane, 05e  
 Lake Superior region: Brooks (T B), 76a,  
     Credner, 70c; Patton, 93; Pumpelly, 73b,  
     78  
 Laurentian: Brooks (T B), 80a  
 Marquette district: Van Hise, 97; Williams  
     (G H), 90  
 Menominee region: Williams (G H), 90  
 Michigamme district, volcanics: Clements, 95  
 Mount Bohemia, intrusive rocks: Wright  
     (F E), 09b  
 Sand grains, types of: Sherzer, 10  
 Trappean rocks, Lake Superior, origin: Foster,  
     61  
 Upper Peninsula: Allen (R C), 15; Brooks  
     (T B), 73a; Houghton (D), 73; Jackson,  
     55; Julien, 73; Wright (C E), 73

*Physical geology*.

- Central Mich.: Mudge, 95  
 Dunes, Lake Superior: Desor, 50d  
 Earthquakes: Hobbs, 11d; Hussey, 11  
 Erosion, Seul Choix Point Peninsula: Ehlers, 18  
 Faulting in glacial gravel and sand, southern  
     Mich.: Henrich, 97

## Michigan—Continued.

*Physical geology*—Continued.

- Geothermal gradient: Lane, 02m  
 Glacial lakes, closing of: Smyth (B B), 98  
 Gogebic iron range, dikes: Boss, 98  
 Huronian-granite contact: Smyth (H L), 93  
 Keweenaw fault: Lane, 16  
 Lateral erosion in rivers: Jefferson, 07  
 Limonite-sand concretions from Spring Lake:  
     Nichols (H W), 06  
 Marl deposits: Russell, 00b  
 Recent changes: Wooldridge, 84  
 Sanilac Co., shore erosion: Gordon (C H), 02a  
 Scours on the River Rouge: Jefferson, 04  
 Shore changes: Gregory (W M), 05  
 Uplift of the Michigan Basin: Hobbs, 11c
- Physiographic geology*.
- Alcona Co., surface geology: Leverett, 02a  
 Algonquin beach: Goldthwait, 08a  
 Ann Arbor, lake beaches: Spencer (J W), 88c;  
     postglacial geology: Wooldridge, 88a  
 Base level, northern Mich.: Van Hise, 96b  
 Beaches and moraines, southeastern Mich.:  
     Taylor (F B), 97a, h  
 Camp Custer area: Leverett, 18, 18a  
 Deer River, development: Clements, 96a  
 Delta of St. Clair River: Cole (L J), 03  
 Detroit district: Sherzer, 17; recent geology:  
     Taylor (F B), 97g  
 Drainage, Saginaw Valley: Lane, 97a; pre-  
     glacial, Lower Mich.: Lane, 01a  
 Drainage systems: Mudge, 94  
 Drift deposits: Winchell (A), 75a; Lake Superior  
     region: Desor, 50e, 51c, e  
 Drift materials, northward transportation:  
     Winchell (A), 65a  
 Drumlins: Russell, 07b  
     Grand Traverse region: Leverett, 06  
     northern Mich.: Russell, 05e  
 Eagle River, preglacial channel: Whittlesey,  
     83, 85  
 Esker at Mason: Wooster, 11  
 General: Lane, 08a; Winchell (A), 73  
 Glacial deposits: Taylor (F B), 11b; Erie basin:  
     Leverett, 02  
 Glacial lakes in Lake Michigan basin: Gold-  
     thwait, 08; Superior basin: Leverett, 17b  
 Glacial outlets: Gordon (C H), 98  
 Glacial striae, Lake Superior: Whittlesey, 54  
 Glaciation, eastern Mich.: Taylor (F B), 96d  
     Grand Rapids area: Leverett, 04b  
     southeastern Mich.: Sherzer, 02; Taylor  
     (F B), 96c  
     Southern Peninsula: Leverett, 01a, 03a, 04a  
 Grand River: Mudge, 93, 99  
 Grand Traverse region, drumlins: Leverett, 05a  
 Huron Co.: Lane, 00  
 Kames, Lansing: Wooster, 84a  
 Lake Whittlesey and the Arkona beaches:  
     Taylor (F B), 05a  
 Mackinac Island, shore lines: Taylor (F B),  
     92, 15  
 Marquette region, glacial phenomena: Davis  
     (C A), 07b  
 Meanders on the Rouge: Davis (D H), 08  
 Menominee, Dickinson, and Iron cos., surface  
     geology: Russell, 07



## Michigan—Continued.

*Physiographic geology*—Continued.

North shore of lakes Huron and Michigan  
Russell, 05a

Northern Peninsula, surface geology: Leverett,  
11, 17

Physical geography: Cooper (W F), 07; Jef-  
ferson, 07a

Pleistocene: Leverett, 15

Pleistocene beaches, Saginaw Co.: Cooper  
(W F), 08

Preglacial drainage: Mudge, 97, 00

River-lake system: Wooldridge, 88

Saginaw Co.: Cooper (W F), 03

St. Clair and Detroit rivers region, drainage  
changes: Taylor (F B), 12b

Scaurs, Rouge River: Jefferson, 04

Shore lines, Elsie and Perrinton quadrangles:  
Leverett, 18c

Green Bay: Taylor (F B), 94a

Lake Superior: Taylor (F B), 94b

Southern Peninsula, surface geology: Leverett,  
17

Stream capture, Ypsilanti region: Bowman (I),  
04

Surface geology: Lane, 08a; Leverett, 17

Uplift of the Michigan Basin: Hobbs, 11c

Walnut Lakes, physiography and geology:  
Davis (C A), 08a

Washtenaw Co.: Winchell (A), 81a

Waste-filled valley: Parkins, 10

Wayne Co.: Sherzer, 13

*Underground water.*

Ann Arbor quadrangle: Russell (I C), 03

Arenac Co.: Gregory (W M), 12

Bay Co.: Cooper (W F), 06

General: Lane, 05g

Huron River, lower: Fuller, 05s

Iron mines and their mine waters: Lane (A C), 09c

Lower Peninsula: Cooper (W F), 04, 05; Lane,  
99; Leverett, 06b, 07

Mineral waters, Lower Peninsula: Lane, 99a

Salt water in Lake mines: Lane, 07a

Southeastern Mich.: Fuller, 05o

Tuscola Co.: Davis (C A), 09c

Upper Peninsula: Lane, 05a; Leverett, 06a, 11

Water supplies, municipal: Leverett, 06d

Michipicoten. *See* Ontario.

Michipicoten Huronian area: Willmott, 01

Michipicoten Island, Ont.: Burwash, 05

Microgeology: Ehrenberg, 54

Microorganisms of coal: Renault, 99

Microsauria, ancestors of the Reptilia: Moodie 09c

Microscopic organisms in Paleozoic rocks: White  
(M C), 62

Microseisms: Burbank, 12, 12a

Microsklerometer: Jaggard, 98b

Microspectroscope: Wherry, 15

Middleton formation: Safford, 92 a, b

Middleton Island, Alaska: Dawson (G M), 93

Midway stage: Harris, 96

Migration of poles: Barrell, 14b

Miles City coal field, Mont.: Collier, 09a

Military geology.

General: Penrose, 17; Pogue, 17

War minerals: Spurr, 18

War work, geological: Smith (P S), 18a

Military geology and topography: Gregory (H E), 18

Milk River coal field, Mont.: Pepperberg, 09a, 12

Millbrig lead and zinc district, Ill.: Grant, 08

Miller, S. A., biography: Bather, 98b; Billings  
(W R B), 98

Miller, W. G., biography: Lamb, 13a

Miller Lake region, Ont.: Burrows (A G), 09

Mills, J. E., biography: Branner, 04

Milwaukee quadrangle: Alden, 06

Mimetism: Chapman, 85a

Mine explosions and earthquakes: Spalding, 09

Mine waters.

Composition: Emmons (W H), 13, 13c; in  
mines of sulphide ores: Hodge (E T), 15

Field assay: Lane, 08e

General: Lane, 08d, e, 09e

Michigan: Keweenaw series: Lane, 11a

Ore-bearing currents: Lane, 14

Mineragraphy, technique: Whitehead, 17

Mineral analyses: Clarke (F W), 03

Mineral deposits: Lindgren, 13

Mineral fuels: Campbell (M R), 07a

Mineral matter of sea: Salisbury, 05

Mineral paints.

California: Aubury, 06

Canada: Willmott, 06

Georgia: Burchard, 07e

Pennsylvania: Miller (B L), 11a, b; Lehigh  
Gap: Agthe, 10; Eckel, 07a

Tennessee: Burchard, 07e

United States: U S G S, 83

Virginia, Coastal Plain: Watson, (T L) 12a

Mineral physiology: Hunt, 82

Mineral reserves: Smith (G O), 18b

Mineral resources (general). *See also Economic  
geology under the names of States.*

Cordilleras: Whittlesey, 63a

General: Patton, 88

New England: Bartlett, 77

Pacific slope: Browne (J R), 69

Southern States: Pratt, 14a

States west of Rocky Mountains: Browne  
(J R), 68

United States: Browne (J R), 67; Raymond,  
69, 70; Smith (G O), 14; Tarr, 94; Taylor  
(J W), 68; U S G S, 83; Whitney, 54, 89

Useful minerals of the United States: Cross, 83a;  
Schrader, 17; Smock, 83a; Williams (A),  
88

Mineral springs: Peale, 86; origin, Vanuxem, 43;  
Western States: Loew, 75a

Mineral waters.

Alaska, southeastern: Wright (C W), 06

Canada: Elworthy, 18

Colorado: Headden, 09a

From crystalline rocks: Fuller, 06d

General: Ellis, 18; Matson, 11a; Peale, 85;  
Sanford 07; Elworthy, 18

Genesis: Ritter, 06

Georgia: McCallie, 10, 13

Kansas: Schrader, 06a

Kentucky, Blue Grass region: Matson, 09

Maryland: Clark (W B), 09

Minnesota, Renville Co.: Berkey, 02

New York, Saratoga Springs region: Cushing,  
14

Oregon: Parks (H M), 12a



**Mineral waters—Continued.**

- Tennessee: Ashley, 10b  
 Thermal waters, genesis: Gautier, 06  
 United States: Dole, 14; U S G S, 83  
 Virginia: Froehling & Robertson, 04; Watson, 07e  
 West Virginia, Pan Handle cos.: Grimsley, 07; Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Wyoming, Big Horn basin: Fisher (C A), 06d  
 Mineral Hill, Nevada: Toll, 12  
 Mineralizing solutions, intrusive pressure: Stevens (B), 14a  
 Mineralogical evolution: Hunt, 88b  
 Mineral Point quadrangle, Wis. (folio no. 145): Grant (U S), 07  
 Miner Ranch oilfield, Cal.: Arnold, 08c  
 Mineralogy (general). *See also* Meteorites; Technique. *For regional, see names of States.*  
 Adularia: Winchell (N H), 99h  
 Albite, composition: Foote (H W), 13  
 Algerite: Hunt, 54a; and apatite: Whitney, 54a  
 Alkali feldspars, temperature stability ranges: Merwin, 11a  
 Alkalies in beryl: Ford (W E), 10; Penfield, 84  
 Allanite and epidote, parallel intergrowths: Hobbs, 93d  
 Alunite, psilomelanite, and titanite: Wherry, 16a  
 Alunite-beudantite group: Schaller, 11k  
 Alunite-jarosite group: Hillebrand, 02  
 Amblygonite: Penfield, 79a  
 Amorphous minerals: Rogers (A F), 17  
 Amphibole, composition: Penfield, 07; classification: Murgoci, 06a  
 Amphiboles: Lane, 94b; optical study: Ford (W E), 14  
 Amphiboles and pyroxenes: Daly (R A), 99  
 Analyses: Clarke (F W), 84, 03, 10a, 15  
 Analysis of silicate and carbonate rocks: Hillebrand, 10  
 Andalusite: Troost, 24b  
 Angles of crystals in sections: Lane, 91  
 Anhydrite, occurrence: Rogers (A F), 15a  
 Anorthite-forsterite-silica system: Andersen, 15  
 Anorthosites, origin: Bowen (N L), 17a, b  
 Arsenides, crystallization: Koenig, 01  
 Artificial lava flow and its spherulitic crystallization: Pirsson, 10  
 Association of minerals: Jackson, 55b  
 Asteriated rose quartz in New York: Manchester, 10  
 Axinite: Ford (W E), 03a  
 Azurite and alamosite: Merwin, 14a  
 Beaumontite, identity with heulandite: Alger, 44  
 Bement collection of minerals: Gratacap, 09; Rath, 86i  
 Benitoite: Hlawatsch, 09, 09a, b; chemical formula: Blasdale, 08; paragenesis and occurrence: Louderback, 09  
 Bernardinite: Stanley-Brown, 91  
 Beryl, etching figures: Honess, 17; prismatic cleavage: Lane, 18a  
 Binary systems: Bowen (N L), 12a, 14b; Shepherd, 09

**Mineralogy—Continued.**

- Birefracting minerals, determination: Wright (F E), 05c  
 Bismuth minerals: Burkart, 74a  
 Black sands, minerals: Warren (C H), 06  
 Boltonite: Brush, 59  
 Bornite: Harrington, 03a; composition: Allen (E T), 16; Wherry, 15c; and relations: Kraus, 14  
 Brucite, determination in rocks: Julien, 05  
 Brun's new data on volcanism: Winchell (A N), 12  
 Cæsium, chromates of: Fraprie, 06  
 Calaverite, development: Smith (G F H), 02  
 Calcite, crystal forms: Rogers (A F), 01a; Schaller, 08a; Whitlock, 15  
 Calcite group: Ford (W E), 17  
 Calcite in silicified wood: Wherry, 17  
 Calcite-sand crystals: Barbour, 02b  
 Calcium carbonate: Merwin, 16; the several forms: Johnston (J), 16a  
 Catalog of minerals: Allen (G N), 66; Chester, 86; Egleston, 63, 66a, 87, 91; Foote (A E), 92; Foote (W M), 04; Hopping, 99; Howell (E E), 93; Robinson, 25; Ward & Howell, 78a, c; Yates, 86; California: Blake (W P), 66  
 Cavities in First Watchung Mountain zeolite deposits: Wherry, 16f  
 Celestialite: Smith (J L), 75d  
 Celestite: Culin, 16d  
 Chalcedony: Wherry, 17f  
 Chalcodite: Brush, 58  
 Chemical examination: Bolton, 77  
 Chemical tests for minerals: Burdick, 17  
 Cherokine (pyromorphite): Hunt, 57h  
 Childrenite and eosphorite: Penfield, 80  
 Chlorine in scapolites: Adams (F D), 79  
 Chlorite group: Pearse, 64  
 Chlorite spar: Whitney, 49d  
 Chlorites, crystallography: Cooke (J P), 67a  
 Chromite, origin and composition: Pratt, 98c, 99  
 Classification: Chapman (E J), 57b; Endlich, 74a; Foye, 75; Penfield, 03; Río, 34; Tassin, 99; according to occurrence: Wherry, 15b  
 Cliftonite: Davison (J M), 02  
 Colerainite, origin: Poitevin, 18a  
 Collecting minerals, directions for: Tassin, 95  
 Collections, American Museum of Natural History: Gratacap, 02  
 Colorado State Bureau of Mines: Duce, 17  
 Hancock: Wolff (J E), 17  
 U. S. National Museum: Tassin, 97  
 Colloid minerals: Greenland, 17; nomenclature: Wherry, 13a  
 Color plate photographs: Levison, 13  
 Columbic acid minerals: Smith (J L), 77a, c  
 Columbite: Dana (E S), 86g  
 Common minerals, determination: Moses, 85, 00  
 Common minerals and rocks: George (R D), 17  
 Constitution and equivalent volume of some mineral species: Hunt, 53  
 Contact goniometer: Penfield, 00f  
 Conversion of rock analyses: Mead (W J), 12  
 Copiapite in coal: McCaughey (W J), 18  
 Copper minerals: Winchell (A N), 01



## Mineralogy—Continued.

- Coracite: Le Conte, 47  
 Corundum: Genth, 73, 82; Hunt, 74e; Shepard, 72a; occurrence: Pratt, 06  
 Crystal class arrangement: Rogers (A F), 01b  
 Crystal drawing: Penfield, 05; and modeling: Blake (J M), 17a  
 Crystal growth: Wright (F E), 17  
 Crystallized mineral specimens, developing: Grenzig, 18  
 Crystallographic intergrowths: Segall, 15  
 Crystallography: Wadsworth, 09; essentials of: Kraus, 06  
 Crystals, change in optical properties with temperature: Kraus, 12b  
 Crystals, classification: Swartz, 09; growth: Taber (S), 16c  
 Damourite: Teschemacher, 46a  
 Dana's Manual of mineralogy: Ford (W E), 12  
 Decimal grouping of plagioclases: Calkins, 17  
 Deformation of minerals: Adams (F D), 10a  
 Delessite, composition: Julien, 08a  
 Density of minerals, determination: Merwin, 11b  
 Descloizite: Hillebrand, 89a  
 Descriptions: Dana (J D), 50e; Shepard, 56; Silliman (jr), 49a  
 Descriptive mineralogy: Bayley, 17; Egleston, 72; Kraus, 11  
 Determination of common minerals and rocks, tables for: Tarr (W A), 14  
 Determination of common ores and minerals: Rowe, 10a  
 Determination of gems: Moses, 15  
 Determination of minerals: Edwards (M G), 16; Hobbs, 14; tables: Crosby, 87; Eakle, 04; Egleston, 67; Foye, 75; Frazer, 01; Luquer, 98  
 Determination of minerals of nonmetallic luster: Moses, 13  
 Determination of opaque minerals: Murdock, 16  
 Determination of rock-forming minerals: Husak, 86  
 Determination of soil-forming minerals: McCaughey, 13  
 Determinative mineralogy: Endlich, 92; Osborn (H S), 92; Wheeler (C G), 80; key: Cubberley, 95; with tables: Lewis (J V), 13  
 Developing crystallized mineral specimens: Hawkins, 17  
 Diagrams of crystals: Egleston, 66  
 Diaspore: Dana (E S), 86e  
 Diasporite, field identification: Wherry, 18g  
 Dictionary of names of minerals: Chester, 96  
 Diopside and its relations to calcium and magnesium metasilicates: Allen (E T), 09  
 Dumortierite: Ford (W E), 02; Schaller, 05a  
 Elementary textbook: Comstock, 41; Phillips (W), 18  
 Elementary crystallography: Bayley, 10  
 Elements: Comstock, 27  
 Emerald: Bruce, 14d  
 Empressite, identity with muthmannite: Schaller, 14a  
 Enceladite: Hunt, 46

## Mineralogy—Continued.

- Enlargement of minerals: Irving, 84  
 Enstatite and clinoenstatite: Wright (F E), 09; Zambonini, 09  
 Etching figures, hexagonal-alternating crystals: Honess, 17a; dihexagonal alternating type: Honess, 18  
 Eumanite and brookite: Dana (J D), 51b  
 Famous mineral localities, Keokuk geode region: Wherry, 18c  
 Fayalite, Yellowstone National Park: Iddings, 85  
 Feldspar, aventurine: Andersen, 15a  
 Feldspar in Keweenawan sandstones: Van Hise, 84  
 Feldspar regeneration: Winchell (N H), 03  
 Feldspars: Day (A L), 04, 05; Rogers (A F), 13a  
     alkaline, low-temperature formation: Daly (R A), 17d  
     determination: Winchell (N H), 98  
     isomorphism and thermal properties: Day (A L), 05a  
     perthitic, quantitative study: Warren (C H), 15  
     triclinic: Penfield, 87b  
 Field book of practical mineralogy: Miller (G W), 01  
 Fluidal cavities in quartz grains: Merrill (G P), 83d  
 Fluidal inclusions, quartz: Silliman (jr), 80a  
 Fluids in cavities of minerals: Brewster, 23  
 Fluorescent gems: Levison, 03  
 Fluorine minerals: Groth, 83  
 Footeite, identity with connellite: Ford (W E), 15a  
 Franklinite, relation to spinel group: Seyms, 76  
 Fusion table: Luquer, 08  
 Fusion under high temperature: Day (A L), 06  
 Galena slipping-planes and lamellar twinning: Cross, 88a  
 Garnet, idiochase, and datolite, in association: Smith (J L), 74b  
 Garnet group: Ford (W E), 15b  
 Gas in smoky quartz: Wright (A W), 81  
 Gel minerals: Greenland, 17  
 Gem collection, U. S. National Museum: Kunz, 89; Tassin, 02  
 Gems and precious stones of North Carolina: Kunz, 07  
 General: Barringer, 97; Bayley, 86, 15; Chapman, 52, 53; Clarke (F W), 86, 87, 90, 15; Dana (J D), 50h, 54, 54a, 67; Dana (E S), 84, 85, 85a, 86, 89, 90; Eyerman, 04; Foote Mineral Company, 17; Foye, 86; Gill, 96; Gratacap, 03; Hall (F), 36; Hawes, 81; Hobbs, 94d; Hunt, 86, 91; Kurr, 69; Lewis (H C), 82; McLeod, 14; Martin (D S), 64; Moses, 97, 18; Richards (E' H), 82, 84; Shepard, 32, 35, 45, 84; Smith (J L), 73, 84; Smith (T), 34; Spencer (L J), 16; Tenney, 73a; Tillman, 00; Williams (G H), 85d  
 Genetic classification of minerals: Emmons (W H), 08a  
 Genetic relations, northern New York; Smyth (C H), 96c



## Mineralogy—Continued.

Geodes, Keokuk beds: Van Tuyl, 16f  
 Glauberite, variations of optic angle of axis: Kraus, 13  
 Glauberite casts: Wherry, 16g  
 Glauberite crystal cavities, Triassic rocks, eastern Pennsylvania: Wherry, 16g  
 Gnomonic projection: Rogers (A F), 07a  
 Goniometer: Rogers (A F), 08  
 Graphical plot for plagioclase feldspars: Wright (F E), 13e  
 Growing crystals, linear force: Hostetter, 17  
 Guide to minerals: Gratacap, 12  
 Gypsum and glauberite, thermo-optical observations: Kraus, 17  
 Gypsum, optic angle variations: Kraus, 12  
 Handbook: Butler (G M), 08, 18a; Hitchings, 85  
 Hardness, dark scale: Lane, 12c  
 Hardness of minerals, determination: Kip, 07  
 Herretite, identity with smithsonite: Genth, 55  
 History, 1818-1918: Ford (W E), 18  
 Homoeomorphism, trimetric system: Dana (J D), 54b  
 Hornblende, new variety: Daly (R A), 99a  
 Hussakite and xenotime: Kraus, 01  
 Hydrogiobertite a mixture: Larsen, 17e  
 Identification of minerals: Moses, 10  
 Ilmenite: Penfield, 97b  
 Indexing a mineral collection: Fairbanks, 18  
 Indices of crystal faces: Rogers (A F), 13d  
 Intergrowths of minerals: Goodchild, 16  
 Interpretation of mineral analyses: Wells, 13b  
 Iridescent quartz, New York City: Scott (G S), 18  
 Iron, cause of blue colors in minerals: Wherry, 18h  
 Iron pyrites, decomposition: Julien, 86; microscopical structure: Julien, 86a  
 Isomorphism: Dana (J D), 50c; between calcite and dolomite: Foote (H W), 14  
 Itacolumnite: Edwards (A M), 70  
 Jacksonite: Jackson, 50b; optical characters: Winchell (N H), 99g  
 Kaolinite, intumescent: Schaller, 16b  
 Kunzite: Baskerville, 03, 04; Davis (R O E), 04  
 Laurentian minerals: Hunt, 66a  
 Lazulite: Merrill (G P), 18e  
 Leidyite: Koenig, 78  
 Lens for interference figures: Johannsen, 13  
 Lettering figures of crystals: Dana (J D), 52a  
 Lievrite (ilvaite): Chapman (E J), 62  
 Lime-alumina-silica system: Day (A L), 15; Rankin, 15  
 Lime-silica minerals: Day (A L), 06a  
 Lincolnite, identity with heulandite: Alger 44,  
 Liquid carbon dioxide in smoky quartz: Hawes, 81a  
 Literature, index to: Moses, 94  
 Litharge: Larsen, 17f  
 Lithium minerals: Hess, 10d  
 Localities: Dewey, 20; Schaeffer, 19; Silliman, 19; Taylor (S), 24a  
 Luminescent spodumene: Wherry, 07  
 Magnesian pyroxenes and amphiboles, artificial: Wright, 07a  
 Masonite: Whitney, 49d

## Mineralogy—Continued.

Mazapilite and arseniosiderite, identity: Larsen, 18  
 Measurement of extinction angles: Wright (F E), 08a  
 Melanochalcite, variable composition: Hunt (W F), 16  
 Melilite and gehlenite, constitution: Clarke (F W), 17b  
 Melilite group: Schaller, 16a  
 Menilite, organic structure: Herrera, 16  
 Merrillite: Wherry, 17k  
 Metalline minerals, classification: Hunt, 89  
 Methods of instruction: Wadsworth, 84d  
 Mica, optical characters: Lewis (H C), 80; optical examination: Blake (W P), 51; Silliman (jr), 50a  
 Mica group: Clarke (F W), 87a, 89d, 91a; Dana (J D) 50g; Walker (T L), 99  
 Microscope, reflecting: Ray, 14a  
 Microsklerometer: Jaggar, 98b  
 Microspectroscope: Wherry, 15  
 Millerite: Palache, 04  
 Mimetism: Chapman, 85a  
 Minasragrite: Schaller, 17b  
 Mineragraph, technique: Whitehead, 17  
 Mineral characters, synopsis of: Richards (R W), 07  
 Mineral formulas: Schaller, 13a  
 Mineral relations from laboratory view point: Day (A L), 10  
 Mineral solution and fusion under high temperatures and pressure: Day (A L), 07  
 Mineral systems: Chapman, 04  
 Mineral transformations: Emerson (B K), 95a  
 Mineralogical chemistry, advances in: Harrington (B J), 95  
 Mineralogical notes: Eakle, 07; Palache, 07; Schaller, 07a, 11  
 Mineralogy: Phillips (A H), 12  
 Minerals, various: Hobbs, 05d  
 Minerals, opaque, microscopical determination: Murdock, 16  
 Minerals and their occurrence (textbook): Miller (W G), 06  
 Minerals forming rocks: Pirsson, 08  
 Minerals in building stones: Luquer, 94  
 Minerals in Field Columbian Museum, notes on: Farrington, 08a  
 Minerals in rock sections: Luquer, 98  
 Minerals of commercial value: Barringer, 97  
 Minerals of the composition of  $MgSiO_3$ : Allen (E T), 06a  
 Minerals of the rare metals: Baskerville, 08  
 Minerals of trap, origin: Dana (J D), 45a  
 Moissanite: Kunz, 05  
 Moldavites, origin: Merrill (G P), 11  
 Molybdenite: Moses, 04  
 Molybdite, composition: Guild, 07; Schaller, 07  
 Monazite: Penfield, 82; in rocks: Derby, 89  
 Muscovite: Steiger, 15; in Cockeysville marble, optical properties: Clark (R W), 15  
 Native element minerals, nomenclature and classification: Wherry, 17d  
 Native elements, occurrence: Wherry, 17j  
 Natural system: Hunt, 86b



## Mineralogy—Continued.

- Neocolemanite: Eakle, 11  
 Neodymium, cause of red-violet color in certain minerals: Wherry, 17a  
 Nephelites: Bowen (N L), 17  
 Nephrite and jadeite: Clark (F W), 88  
 Nevada, Humboldt Co.: Ransome, 09d  
 New crystal forms of minerals: Whitlock, 10c, d  
 New England: Shepard, 30  
 New mineral names: Ford (W E), 16b  
 New Jersey, Newark igneous rocks: Levison, 09  
 Niobates: Smith (J L), 77e  
 Nomenclature: Chester (A H), 92; Dana (J D), 37a, 67a; Rogers (A F), 13b, 14a; Washington, 12a; Wherry, 14b  
 Notation of faces of crystals: Egleston, 71  
 Objects and method: Hunt, 67a  
 Optic axial angle, measurement of: Wright (F E), 07  
 Optical mineralogy: Edwards (M G), 16; Luquer, 96b; elements of: Winchell (N H), 09a; laboratory work in: Winchell (A N), 11  
 Orthoclase as a gangue mineral: Lindgren, 98b; in Cortlandt norite, composition: Williams (G H), 87b  
 Outline of mineralogy: Finlay (G I), 10a  
 Pacific States, unusual minerals: Turner (H W), 02a  
 Paragenesis: Rogers (A F), 10d, 12e; glaucophane-bearing rocks of California: Smith (J P), 06  
 Parisite and synchisite, identity: Palache, 12  
 Partschinite: Larsen, 17h  
 Pearcite, formula: Van Horn (F R), 11  
 Pectolite: Whitney, 60  
 Peganite, so-called, Arkansas: Chester (A H), 77  
 Penfieldite: Larsen, 17g  
 Petroleum in quartz crystal: Reese, 98  
 Phlogopite: Fritz-Gaertner, 79  
 Phosphorescence in wollastonite: Hillebrand, 96  
 Phosphorescent calcites: Headden, 07b  
 Plagioclase, melting phenomena: Bowen (N L), 13b  
 Plagioclases, decimal grouping: Calkins, 17  
 Plotting crystal zones on the sphere: Blake (J M), 16  
 Polianite: Dana (E S), 88  
 Polybasite, formula: Van Horn (F R), 11  
 Practical field geology: Farrell, 12  
 Practical geology and mineralogy: Hamman, 11  
 Practical mineralogy: Rowe, 11  
 Pressure phenomena accompanying growth of crystals: Taber (S), 17  
 Progress 1882-4: Lewis (H C), 83; in 1898: Hamilton, 99; in 1899: Hamilton, 00  
 Protractor: Penfield, 00f  
 Pseudomorphs, petrifications, and alterations: Rogers (A F), 10  
 Pseudomorphs of limonite after marcasite: North, 13  
 Pyrite, absence from certain zeolite localities: Lewis (J V), 16  
 Pyrite and marcasite: Julien, 02a  
 Pyrite carrying gold and galena of unusual habit: Pogue, 09a

## Mineralogy—Continued.

- Pyromorphite, crystals: Shannon (E V), 17  
 Pyroxene: Troost, 23, 27; hemihedrism: Williams (G H), 89  
 Pyroxenes, monoclinic: Ries, 96a  
 Pyrrhite: Teschemacher, 46a  
 Quartz: Wright (F E), 14a  
 change in angles with temperature: Wright (F E), 13f  
 colored varieties: Watson (T L), 17a  
 hollow, Arizona: Kunz, 87h  
 Quartz and calcite crystals: Dana (E S), 76d  
 Quartz and fluorite as standards of density and refractive index: Merwin, 11  
 Quartz crystal with cavity, Waterbury, Vermont: Alger, 50b  
 Quartz crystals, formation: Wherry, 07b  
 Radioactive minerals: Boltwood, 05; Boyer, 10  
 Rare earths: Kraus, 01  
 Rare metals: Baskerville, 08  
 Recasting of analyses: Julien, 08  
 Refraction and birefringence of rock-making minerals, table of index of: Hotchkiss, 08  
 Relations between composition and physical properties of mineral: Cox (G H), 10  
 Rock minerals, character and determination: Iddings, 03  
 Rock-forming minerals, determination: Johannsen, 08; table of index of refraction and birefringence: Hotchkiss, 08  
 Role of water in tremolite and certain other minerals: Allen (E T), 08  
 Roscoelite: Wright (F E), 14  
 Ruff's Mountain meteorite, iron phosphide in: Wherry, 17h  
 Rutile, black, and strueverite, identity: Headen, 17  
 Rutile group: Schaller, 11j  
 Saline dome minerals, Texas-Louisiana Coastal Plain: Hawkins, 18d  
 Saponite: Owen (D D), 53a  
 Saussurite: Hunt, 59  
 Scale of hardness: Lane, 12c  
 Scovillite and rhabdophane, identity: Brush, 84  
 Secondary minerals of copper-bearing rocks: Winchell (N H), 99h  
 Seleniferous sulphur: Brown (G V), 17  
 Scapolite: Helmhacker, 96  
 Sericite a low temperature hydrothermal mineral: Rogers (A F), 16  
 Serpentine, change to quartz: Rand, 80a  
 Silica, deposition: Lindgren, 17  
 Silica minerals, stability relations: Fenner, 13  
 Silicates, check list: Egleston, 66b; classification: Hunt, 86b, 87  
 Silver minerals: Guild, 17  
 Soda-leucite, re-formation: Read, 06a  
 Solid solution: Foote (H W), 13a; with special reference to nephelite: Foote, 11  
 Spencerite, crystal form: Walker (T L), 17  
 Sperrylite, artificial: Wells (H L), 13  
 Sphene, cleavage: Williams (G H), 85; and euclase, isomorphism: Dana (J D), 53b  
 Spodumene: Brush, 50  
 Stability ranges of minerals: Wright (F E), 11b  
 Stauroilite: Penfield, 94



**Mineralogy—Continued.**

- Stereographic projection: Penfield, 01  
 Stengite, refractive indices: Schaller, 13b  
 Strontianite: Culin, 16d  
 Study of common minerals: Hopping, 00  
 Sulpho-minerals: Kraus, 14  
 Sulphides of zinc, cadmium, and mercury:  
   Allen (E T), 12  
 Sundry minerals: Alger, 46, 46a; Blake (W P),  
   52, 67; Blum, 30; Brush, 58a; Burton, 68;  
   Chester (A H), 87; Clarke (F W), 84a, 89,  
   90a, 99b, 00, 00a; Dana (E S), 84c, 86e;  
   Farrington, 00; Genth, 53, 82, 86, 87, 91a;  
   Headden, 05a; Hidden 85, 86a, 87a, 88a;  
   Hillebrand, 85b, 89, 99 a,c, 00a; Hobbs, 95;  
   Hunt, 52b; Joy, 65; Kunz, 86j, 87e, 88a,  
   89a,c; Leeds, 73; Moses, 01, 05; Penfield,  
   86a, 88a, 92, 94, 94e,f; Pirsson, 91b; Pratt,  
   94; Rogers (A F), 01, 02a; Schaller, 05b,  
   14, 16a; Shepard, 51, 51a, 52a, 64, 66a, 70,  
   80a; Smith (J L), 53; Smith (W B), 88;  
   Taylor (W J), 58, 59; Teschemacher, 44;  
   Troost, 25c; Turner, 02a; Tyler, 66; War-  
   ren (C H), 98, 03; Whitfield (J E), 87a;  
   Whitney, 48, 48a  
   Lake Superior: Whitney, 47a, 59  
   Rocky Mountain region: Cross, 85  
 Synthetic sapphires: Moses, 10a  
 Tables for determination of minerals: Bar-  
   ringer, 97; Frazer, 75, 10; Kraus, 11a;  
   Penfield, 03, 07; Tillman, 00  
 Teaching optical mineralogy: McNair, 11  
 Tellurium and bismuth minerals: Genth, 74b  
 Tellurium and vanadium minerals: Genth, 78  
 Tellurium minerals: Burkart, 73, 74a  
 Temiskaming ores: Campbell (W), 06b  
 Ternary system; diopside, forsterite, silica:  
   Bowen (N L), 14c  
 Tests on opaque minerals: Bruce, 14a  
 Textbooks: Aikin, 15; Brush, 74; Dana (J D),  
   37, 48; Dana (E S), 77, 92, 95, 16; Emmons  
   (E), 26; Erni, 85; Foye, 86; Landero, 88;  
   Moses, 97; Phillips (W), 44; Poey, 72;  
   Rogers (A F), 12; Shepard, 32, 35; Spen-  
   cer (L J), 16; Whitman, 72; elementary:  
   Cleaveland, 16  
 Thalénite: Hillebrand, 05b  
 Thaumassite: Wherry, 171  
 Topaz: Eakle, 98; Penfield, 94d; crystalliza-  
   tion: Chapman, 93  
 Topaz and garnet in lithophyses of rhyolite:  
   Cross, 86a  
 Tourmaline: Clarke (F W), 99a; Dana (J D),  
   52; Gratacap, 17; Leidy, 82a; Penfield,  
   99, 00c; Riggs, 88; composition: Kunz,  
   02b  
 Torquoise: Gratacap, 17; Penfield, 00e; Pogue,  
   15  
 Twinning in pseudomorphs, New Jersey: Can-  
   field, 17  
 Twins, staurolite and pyrrhotite: Dana (E S),  
   76c  
 Uranium and pyrochlore: Teschemacher, 45  
 Uranothallite and liebigite, identity: Larsen, 17k  
 Useful minerals: Schrader, 17  
 Vanadium minerals: Genth, 76a

**Mineralogy—Continued.**

- Variations in composition of minerals: Wherry,  
   14c  
 Veins of asbestiform minerals, origin: Taber  
   (S), 16  
 Vermiculites: Cooke (J P), 74, 75a  
 Vivianite, color change: Watson, 18f  
 Warwickite: Hunt, 51b; Smith (J L), 74a  
 Water crystals: Canfield, 17a  
 Wollastonite and pseudo-wollastonite: Allen  
   (E T), 06  
 Zincite: Moses, 95  
 Zonochlorite and chlorastrolite: Hawes, 75c  
 Mineville magnetite deposits: Granberry, 06  
 Mingan Islands, Ordovician section: Schuchert, 10d  
 Mining subsidence: Knox, 14  
 Minneapolis-St. Paul folio, **Minn.** (no. 201): Sarde-  
   son, 16  
**Minnesota.**  
   Aitkin Co.: Upham, 99  
   Atlas: Winchell (N H), 01  
   Becker Co.: Upham, 88  
   Beltrami Co.: Todd, 99a  
   Benton and Sherburne cos.: Upham, 88  
   Bibliography: Gregory (W), 15  
   Bigstone and Lac qui Parle cos.: Upham, 84  
   Blue Earth Co.: Upham, 84  
   Brown and Redwood cos.: Upham, 84  
   Carlton Co.: Winchell (N H), 99a  
   Carver and Scott cos.: Upham, 88  
   Cass Co.: Upham, 99  
   Chisago, Isanti, and Anoka cos.: Upham, 88  
   Clay Co.: Upham, 88  
   Cook Co.: Grant (U S), 99  
   Cottonwood and Jackson cos.: Upham, 84  
   Crow Wing and Morrison cos.: Upham, 88  
   Dakota Co.: Winchell (N H), 88a  
   Dodge Co.: Harrington (M W), 84  
   Douglas and Pope cos.: Upham, 88  
   Early geological work: Winchell (N H), 74c  
   Faribault Co.: Upham, 84  
   Fillmore Co.: Winchell (N H), 84a  
   Franconia, geology: Berkey, 06b  
   Freeborn Co.: Winchell (N H), 84a  
   General: Allen (J), 34; Emmons (S F), 93;  
     Pope, 50; Schoolcraft, 34, 55; Upham,  
     89h; Winchell (N H), 81d  
   Geological surveys: Winchell (N H), 94  
     history: Winchell (N H), 84, 89  
     reports: Emmons (W H), 16; Hanchett, 65;  
     Winchell (N H), 73b, 77  
     results: Winchell (N H), 03b  
   Glacial man: Babbitt, 84  
   Goodhue Co.: Winchell (N H), 88a  
   Grant and Stevens cos.: Upham, 88  
   Hennepin Co.: Winchell (N H), 88a, 93g  
   Houston Co.: Winchell (N H), 84a  
   Hubbard Co.: Todd, 99a  
   Index to survey reports: Winchell (N H), 99c  
   Itasca Co.: Grant (U S), 99  
   Kandiyohi and Meeker cos.: Upham, 88  
   Lake Co.: Winchell (N H), 99a  
   Le Sueur Co.: Upham, 84  
   McLeod Co.: Upham, 88  
   Marshall, Roseau, and Kittson cos.: Todd, 99a  
   Mille Lacs and Kanabec cos.: Upham, 88  
   Mower Co.: Winchell (N H), 84a



## Minnesota—Continued.

Murray and Nobles cos.: Upham, 84  
 Norman and Polk cos.: Todd, 99a  
 Olmsted Co.: Harrington (M W), 84  
 Otter Tail Co.: Upham, 88  
 Paleozoic fossils in glacial drift: Sardeson, 01a  
 Pine Co.: Upham, 88  
 Pipestone and Rock cos.: Winchell (N H), 84a  
 Pipestone quarry: White (C A), 69  
 Ramsey Co.: Winchell (N H), 88a  
 Renville Co.: Upham, 88  
 Rice Co.: Winchell (N H), 84a  
 St. Louis Co.: Winchell (N H), 99a  
 Sibley and Nicollet cos.: Upham, 88  
 Soils, source of constituents: Hall (C W), 01c  
 Stearns Co.: Upham, 88  
 Steele Co.: Harrington (M W), 84  
 Swift and Chippewa cos.: Upham, 88  
 Upper Mississippi region: Garrison, 81  
 Wabash Co.: Winchell (N H), 88a  
 Wadena and Todd cos.: Upham, 88  
 Waseca Co.: Upham, 84  
 Washington Co.: Winchell (N H), 88a  
 Watonwan and Martin cos.: Upham, 84  
 Wilkin and Traverse cos.: Upham, 88  
 Winona Co.: Winchell (N H), 84a  
 Wright Co.: Upham, 88  
 Yellow Medicine, Lyon, and Lincoln cos.: Upham, 84

*Economic geology.*

Animikie (Loon Lake) district: Van Hise, 11  
 Blue Earth Co.: Bechdolt, 85; Upham, 84  
 Building stone: Winchell (N H), 80, 84  
 Cement materials: Eckel, 13; Winchell (N H), 80  
 Clay: Berkey, 02, 02a; Grout, 14, 16a; Winchell (N H), 80  
 Cobalt, Monticello: Meeds, 96  
 Copper: Hall (C W), 89; Soudan: Berkey, 96b; Eby, 96  
 Cuyuna district: Cheney, 15  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Freeborn Co.: Winchell (N H), 75b  
 General: Eames, 66a; Grant (U S), 99a; Norwood, 52; Owen (D D), 52  
 Gold, Rainy Lake region: Winchell (H V), 95, 99  
 Granite: Winchell (N H), 84d  
 Gunflint Lake district: Van Hise, 11  
 Highland Range: Elftman, 03  
 Houston Co.: Winchell (N H), 77a  
 Humboldt salt well, Kittson Co.: Winchell (N H), 85c  
 Iron: Bachellery, 00; Emmons (W H), 16a; Soper, 10b, 11; Van Barneveld, 12; Willis, 86c; Winchell (H V), 89, 91a, 94b, 95a; Winchell (N H), 91, 91e, 92b, 98g, h, 01d, 11; Zapffe, 12  
 Aitkin Co.: Thomas (K), 04  
 Crow Wing country: Woodbridge, 07  
 Cuyuna district: Appleby, 15; Cheney, 15; Harder, 17, 17a, 18; Kellogg, 13; Leith, 07a; McCarty, 15; Newton, 18; Thomas (K), 12a; Van Hise, 11; Winchell (N H), 07; Zapffe, 11; South range: Zapffe, 13  
 Cuyuna Range: Adams (F S), 10  
 Keewatin, origin: Winchell (N H), 89f  
 Lake Superior region: Brinsmade, 08g; Crowell & Murray, 11; Grant (U S), 04; Macco, 04; Parker (R A), 93; Van Hise, 92b, 01

## Minnesota—Continued.

*Economic geology—Continued.*

Iron: Mesabi district: Appleby, 13; Brakenbury, 00; Jennings, 94; Leith, 03, 03c; Meeks, 07; Spurr, 94, 94d; Van Hise, 01, 11; Winchell (H V), 93, 93b, 03a; Winchell (N H), 85, 92g, 93e, 99a, 08; Wolff (J F), 09, 15, 16, 18; Woodbridge, 05; Biwabik mine: Winchell (H V), 93c; Cook Co.: Grant (U S), 98  
 Northeastern Minn.: Grant (U S), 99; Winchell (A), 87  
 Northern Minn.: Chester (A H), 84  
 Taconic: Winchell (N H), 90b  
 Vermilion Range: Abbott (C E), 07, 07a; Carlyle, 05; Vermilion district: Clements, 03; Smyth (H L), 96a; Van Hise, 01, 11; Winchell (N H), 85a, 87; origin: Van Hise, 89a  
 Iron-bearing formation, igneous intrusion: Zapffe, 12  
 Keweenaw copper deposits: Grout, 10  
 Lake Superior region: Eames, 66; Nicholson, 75m; Norwood, 52; Whittlesey, 66a  
 Magnetite deposits of Duluth gabbro, magnetic survey of: Broderick, 18  
 Manganese: Harder, 10; Wright Co.: Winchell (N H), 93c  
 Manganiferous iron ores, Cuyuna district: Harder, 17a  
 Minnesota Valley: Winchell (N H), 74b  
 Natural gas: Winchell (N H), 89a  
 Northeastern Minn.: Grant (U S), 94, 99; Spurr, 94a; Winchell (A), 87, 88b, 91b  
 Northern Minn.: Winchell (N H), 79  
 Ore deposits: Elftman, 96a  
 Peat: Soper, 16, 17a; Winchell (N H), 74b  
 Pigeon Point district: Van Hise, 11  
 Rainy Lake gold region: Winchell (H V), 95, 99  
 Ramsey Co.: Winchell (N H), 78c  
 Rice Co.: Sperry, 78  
 Salt well, Humboldt: Winchell (N H), 84f  
 Shale: Grout, 14  
 Slate: Dale, 06c  
 Stone: Bowles, 18a; Winchell (N H), 80  
 Structural materials: Burchard, 10a  
 Titaniferous magnetites, northeastern Minn.: Broderick, 17  
*Historical geology.*  
 Aitkin Co.: Thomas (K), 04; Upham, 99  
 Akeley Lake region, northeastern Minn.: Bayley, 92  
 Animikie, unconformities: Winchell (A), 88a  
 Animikie slates: Winchell (N H), 88c  
 Animikie (Loon Lake) district: Van Hise, 11  
 Anorthosites, Lake Superior region: Lawson, 93; northeastern Minn.: Elftman, 94a  
 Archean: Hall (C W), 99b; Winchell (N H), 98a, 00, 00a  
 Archean greenstones, origin: Winchell (N H), 95d  
 Atlas: Winchell (N H), 01  
 Becker Co.: Upham, 88  
 Belleplaine, Scott Co.: Winchell (A), 72; salt well: Winchell (N H), 74b  
 Beltrami Co.: Todd, 99a  
 Benton and Sherburne cos.: Upham, 88



## Minnesota—Continued.

*Historical geology—Continued.*

- Bigstone and Lac qui Parle cos.: Upham, 84  
 Blue Earth Co.: Bechdolt, 85; Upham, 84  
 Borings: Winchell (N H), 85c, 86  
 East Minneapolis: Winchell (N H), 76a  
 Minneapolis: Winchell (N H), 82b, 85d  
 Minneopa: Hall (C W), 91a  
 Stillwater: Meeds, 91  
 Brown and Redwood cos.: Upham, 84  
 Cambrian: Winchell (N H), 86b  
 Carlton Co.: Winchell (N H), 99a  
 Carver and Scott cos.: Upham, 88  
 Cass Co.: Upham, 99  
 Central and western Minn.: Upham, 80  
 Central Minn.: Upham, 84a  
 Chengwatona series: Hall (C W), 00  
 Chisago, Isanti, and Anoka cos.: Upham, 88  
 Clay Co.: Upham, 88  
 Conglomerates in gneissic terranes: Winchell (A), 89b  
 Cook Co.: Grant (U S), 99  
 Cottonwood and Jackson cos.: Upham, 84  
 Cretaceous: Sardeson, 98a; Winchell (N H), 78f  
 northern Minn.: Winchell, 93a  
 Sauk Valley: Kloos, 72  
 Crow Wing and Morrison cos.: Upham, 88  
 Crystalline rocks: Winchell (N H), 84e, 89b  
 Cupriferous rocks: Hall (C W), 89; Winchell (N H), 81b, 82c  
 Cuyuna district: Cheney, 15; Harder, 17, 17a, 18; Van Hise, 11; Zapffe, 11  
 Cuyuna Range: Adams (F S), 10  
 Dakota Co.: Winchell (N H), 88a  
 Dalles of the St. Croix: Berkey, 98  
 Dam Lake quartzite: Ayers, 11a  
 Dikes, Minnesota River valley: Hall (C W), 91c  
 Dodge Co.: Harrington (M W), 76, 84  
 Douglas and Pope cos.: Upham, 88  
 Duluth lopolith: Grout, 18a  
 East central Minn.: Harder, 18  
 Eolian deposits, eastern Minn.: Hall (C W), 99a  
 Eruptive rocks: Winchell (N H), 89i  
 Fargo quadrangle: Hall (C M), 05  
 Faribault Co.: Upham, 84  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Freeborn Co.: Winchell (N H), 75b, 84a  
 Gabbro, northeastern Minn.: Elftman, 95  
 Gabbro rocks: Winchell (N H), 93  
 Galena series: Sardeson, 98, 07  
 General: Anderson (C L), 61; Bowles, 18a; Eames, 66a; Elftman, 99; Grant (U S), 99a; Grout, 14; Hall (James), 69a; Hall (C W), 89b, 01b, 03a; Kloos, 71, 77; Norwood, 52; Owen (D D), 51, 52, 52f; Shumard (B F), 52; Winchell (H V), 87; Winchell (N H), 73a, 74c, 78a, 82d, 88, 99  
 Goodhue Co.: Winchell (N H), 88a  
 Grant and Stevens cos.: Upham, 88  
 Greenstone: Winchell (N H), 98i  
 Greenwood Lake area: Elftman, 94c  
 Gunflint Lake district: Van Hise, 11  
 Hennepin Co.: Winchell (N H), 77b, 88a, 93g  
 Highland Range: Elftman, 03  
 Houston Co.: Winchell (N H), 77a, 84a  
 Hubbard Co.: Todd, 99a

## Minnesota—Continued.

*Historical geology—Continued.*

- Humbolt salt well, Kittson Co.: Winchell (N H), 85c  
 Huronian: Winchell (A), 91a  
 Iron formations: Winchell (N H), 91e; Cuyuna Range: Adams (F D), 10c  
 Iron ranges: Van Barneveld, 12  
 Iron regions: Winchell (H V), 89, 91a  
 Iron-bearing rocks, Mesabi range: Spurr, 94  
 Itasca Co.: Culver, 94; Grant (U S), 99  
 Kandiyohi and Meeker cos.: Upham, 88  
 Kawishiwin agglomerate, Ely: Winchell (N H), 92e  
 Keewatin, distribution: Hall (C W), 99c; volcanic rocks: Grant (U S), 94b  
 Keewatin and Laurentide ice sheets: Elftman, 03c  
 Keewatin area: Hall (C W), 01a  
 Kekequabic Lake, northeastern Minn.: Grant (U S), 93a  
 Keweenaw series: Irving, 83b  
 Keweenawan area: Hall (C W), 01; northeastern Minn.: Elftman, 98  
 Keweenawan rocks, Grand Portage Island: Grant (U S), 94a; Lake of the Woods: Winchell (N H), 06  
 Laccolithic sills, northwest coast of Lake Superior: Lawson, 93a  
 Lake Co.: Winchell (N H), 99a  
 Lake Superior region: Hall (C W), 80; Lawson, 93b; Leith, 05a; Norwood, 52; Van Hise, 91; Whittlesey, 66a  
 Le Sueur Co.: Upham, 84  
 Lignite, Cretaceous: Winchell (N H), 75d  
 Little Falls: Brower, 02; Winchell (N H), 02c  
 McLeod Co.: Upham, 88  
 Magnesian series: Hall (C W), 95; Sardeson, 96b  
 Mankato: Bechdolt, 89  
 Marshall, Roseau, and Kittson cos.: Todd, 99a  
 Mesabi and Vermilion iron districts: Winchell (N H), 84c  
 Mesabi iron range: Leith, 02, 03; Spurr, 94; Van Hise, 11; Winchell (H V), 93, 93b; Winchell (N H), 85, 93e, 99a; Wolff (J F), 16; Cook Co.: Grant (U S), 98  
 Mesabi rocks: Winchell (N H), 09; age: Winchell (N H), 13a; section: Winchell (N H), 09  
 Mille Lacs and Kanabec cos.: Upham, 88  
 Minneapolis-St. Paul district: Sardeson, 16  
 Minnesota Valley: Winchell (N H), 74b, 91b  
 Moraines: Todd, 96d, 98a  
 Morrison Co.: Winchell (N H), 78b, 93e  
 Mower Co.: Winchell (N H), 75c, 84a; Austin, sandrock, age: Williams (H S), 84a  
 Murray and Nobles cos.: Upham, 84  
 Norman and Polk cos.: Todd, 99a  
 Northeastern Minn.: Broderick, 17; Elftman, 94; Grant (U S), 89, 93, 94, 99; Spurr, 94a; Upham, 94; Winchell (A), 87, 88; Winchell (N H), 88b, 91b, 93, 93e, 97a, 99b  
 Northern Minn.: Winchell (H V), 88; Winchell (N H), 79  
 Northern Pacific junction: Winchell (N H), 93b  
 Northwestern Minn.: Todd, 93, 94  
 Northfield, Shakopee limestone: Chaney 92



## Minnesota—Continued.

*Historical geology—Continued.*

- Ogishke conglomerate: Grant (U S), 92; Winchell (N H), 88c, 90e  
 Ogishke Muncie conglomerate: Grant (U S), 96  
 Olmsted Co.: Harrington (M W), 76, 84  
 Ordovician: Sardeson, 92, 01c; Mississippi Valley: Winchell (N H), 97; historical sketch: Winchell (N H), 95  
 Otter Tail Co.: Upham, 88  
 Paleogeography of St. Peter time: Berkey, 06  
 Pegmatites of Duluth gabbro: Grout, 18  
 Pewabic quartzite: Elftman, 93, 96  
 Pigeon Point: Bayley, 93; Daly (R A), 17b; Owen (R), 52; Van Hise, 11  
 Pine Co.: Upham, 88  
 Pipestone Co.: Winchell (N H), 78d, 84a  
 Pipestone quarry: Hayden, 66, 67a  
 Pope Co.: Winchell (N H), 85  
 Potsdam and Lower Magnesian formations: James (J F), 97  
 Potsdam sandstone: Winchell (N H), 82a  
 Prairie Island: Upham, 03g  
 Pre-Cambrian: Lawson, 00a  
 Pre-Silurian nomenclature: Winchell (N H), 93d  
 Primordial quartzite: Winchell (N H), 88f  
 Rainy Lake gold region: Winchell (H V), 95, 99  
 Ramsey Co.: Winchell (N H), 78c, 88a  
 Red sandstone series: Hall (C W), 08  
 Red Lake region: Upham, 99  
 Red River Valley: Winchell (N H), 78  
 Renville Co.: Upham, 88  
 Redstone quartzite: Sardeson, 08a  
 Rice Co.: Sperry, 78; Winchell (N H), 84a  
 Rock Co.: Winchell (N H), 78d, 84a  
 Saganaga syenite, age: Selwyn, 92; Winchell (H V), 91  
 Saint Anthony Falls: Sardeson, 08  
 St. Croix Dalles: Berkey, 97; glacial features: Chamberlin (R T), 05  
 St. Croix region: Owen (D D), 51a  
 St. Louis and Vermilion rivers: Whittlesey, 66b  
 St. Louis Co.: Winchell (N H), 99a  
 St. Peter sandstone: Berkey, 05c; James (J F), 94; Sardeson, 96a  
 Schists, northeastern Minn.: Winchell (H V), 89a  
 Sibley and Nicollet cos.: Upham, 88  
 Snake River valley, conglomerate and amygdaloids: Smith (H W), 01  
 Southeastern Minn.: Hall (C W), 92, 11a  
 Southern Minn.: Hall (James), 67f; Hurlbut, 70  
 Southwestern Minn.: Hall (C W), 99  
 Stearns Co.: Upham, 88  
 Steele Co.: Harrington (M W), 76, 84  
 Swift and Chippewa cos.: Upham, 88  
 Thomson slates: Spurr, 94e  
 Trenton limestone, Minneapolis: Herrick, 77; and St. Paul: Hall (C W), 89a  
 Vermilion district: Clements, 02a, 03; Van Hise, 11  
 Vermilion range: Winchell (N H), 87; western part: Smyth (H L), 96a  
 Wabasha Co.: Winchell (N H), 88a  
 Wadena and Todd cos.: Upham, 88

## Minnesota—Continued.

*Historical geology—Continued.*

- Waseca Co.: Upham, 84  
 Washington Co.: Winchell (N H), 88a  
 Watonwan and Martin cos.: Upham, 84  
 Wilkin and Traverse cos.: Upham, 88  
 Winona Co.: Winchell (N H), 84a  
 Wright Co.: Upham, 88  
 Yellow Medicine, Lyon, and Lincoln cos.: Upham, 84

*Mineralogy.*

- Apophyllite geode: Berkey, 93  
 Chlorastrolite and zonochlorite: Winchell (N H), 99e  
 Copper minerals, Soudan: Berkey, 97a  
 Datolite: Berkey, 96  
 General: Bowles, 18a; Winchell (N H), 84b, 85h, 00c  
 Grand Marais, Cook Co.: Peckham, 80  
 Labradorite from gabbro: Winchell (N H), 96f  
 Mesolite: Winchell (N H), 98d  
 Meteorite, Arlington iron: Winchell (N H), 96b; Fisher, Polk Co.: Merrill (G P), 15; Winchell (N H), 96a, e, 97b  
 Minnesota no. 1: Winchell (N H), 94e  
 Minerals, new: Winchell (H V), 88a  
 Sundry minerals: Berkey, 95  
 Thalite: Owen (D D), 53; and bowlingite: Winchell (N H), 99d  
 Thomsonite and lintonite, Lake Superior region: Winchell (N H), 98f  
 Zeolites, Lake Superior region: Winchell (N H), 99f

*Paleontology.*

- Bathyurus, Ordovician: Vogdes, 84  
 Cremacrinus punctatus: Ulrich, 86b  
 Cretaceous: Winchell (N H), 95a  
   microscopical fauna: Woodward (A), 95  
   Plantae: Lesquereux, 84a, 95  
 Cryptozoon, Northfield: Chaney, 92  
 Diatomaceae, interglacial peat: Smith (H L), 93; Thomas (B W), 93  
 Dikelocephalinae, Cambrian: Walcott, 10  
 Elephant, Winona Co.: Holzinger, 85  
 Foraminifera, Meeker Co.: Woodward (A), 85; in drift: Leidy, 84a  
 Houston Co.: Winchell (N H), 77a  
 Illaenus: Foerste, 87a  
 Lichas, Ordovician: Ulrich, 92c  
 Lichenaria: Sardeson, 99b  
 Lingula and Paradoxides in red quartzite: Winchell (N H), 89h  
 Magnesian series: Sardeson, 96b  
 Ordovician: Sardeson, 92a, 01d; Winchell (N H), 86a  
 Brachiopoda: Winchell (N H), 80b, 81a, 92d, 95c  
 Bryozoa: Ulrich, 86a, 95a  
 Cephalopoda: Clarke (J M), 97c  
 Gastropoda: Ulrich, 97b  
 Ostracoda: Ulrich, 97a  
 Pelecypoda: Ulrich, 92, 92a, 97  
 sponges, graptolites, and corals: Winchell (N H), 95b  
 Trilobita: Clarke (J M), 97b; Raymond (P E), 10a



## Minnesota—Continued.

*Paleontology*—Continued.

- Organic remains in iron-bearing rocks: Cayeux, 11  
 Ostracoda: Ulrich, 90f, 97a, 00  
 Paleozoic, list: Bierbauer, 91  
 Paleozoic fossils in the drift: Sardeson, 01a  
 Pipestone, red quartzite: Winchell (N H), 85f  
 Pleistocene mammals: Winchell (N H), 10  
 Potsdam fauna: Hall, 63j  
 St. Croix Dalles: Berkey, 97  
 St. Croix region: Owen (D D), 51a  
 St. Peter sandstone: Sardeson, 96a, 01b  
 Strophocrinus, Ordovician: Sardeson, 99  
 Trenton Bryozoa: Ulrich, 90e  
 Trilobites, Lowville and Black River formations; Raymond (P E), 10a

*Petrology*.

- Akeley Lake region, northeastern Minn.: Bayley, 92  
 Analyses: Dodge (J A), 82  
 Anorthosites, Lake Superior region: Lawson, 93  
 Augite soda granite: Grant (U S), 93c  
 Central Minn.: Upham, 84a  
 Composition of some rocks and minerals: Grout, 10b  
 Crystalline rocks: Streng, 77; Winchell (N H), 85b, g, 89b, 00b  
 Cupriferous rocks: Winchell (N H), 82c  
 Cuyuna district: Harder, 17  
 Dikes, Minnesota River valley: Hall (C W), 91c  
 Duluth gabbro: Grout, 18b, e  
 Eruptive débris at Taylor's Falls: Winchell (N H), 98b  
 Eruptive rocks: Winchell (N H), 89i  
 Gabbro: Bayley, 92c; northeastern Minn.: Bayley, 95a; Elftman, 95; Winchell (N H), 93  
 Gabbroid rocks: Winchell (A N), 00  
 General: Bowles, 18a; Elftman, 99a; Grant (U S), 99b; Winchell (H V), 87; Winchell (N H), 80a, 82, 84, 00c  
 Iron-bearing formation, effect of intrusion: Zapffe, 12  
 Iron-bearing rocks, Mesabi range: Spurr, 94  
 Keewatin area: Hall (C W), 01a  
 Kekequabic Lake, northeastern Minn.: Grant (U S), 93a  
 Keweenawan area: Hall (C W), 01; Elftmann, 98; petrography: Grout, 10a  
 Koochiching granite: Winchell (A N), 97a  
 Laccolithic sills, northwest coast of Lake Superior; Lawson, 93a  
 Lake Co.: Winchell (N H), 99a  
 Mesabi district: Leith, 03; Winchell (N H), 99a; actinolite schist: Bayley, 93b  
 Mesabi section: Winchell (N H), 09  
 Northeastern Minn.: Elftman, 94; Grant (U S), 89, 93, 93b, 94; Winchell (A), 87; Winchell (N H), 88b, 91b, 99b  
 Northern Minn.: Winchell (N H), 81  
 Pegmatites of Duluth gabbro: Grout, 18  
 Peridotites, gabbros, diabases, andesites: Wadsworth, 87  
 Pigeon Point rocks: Bayley, 90a, 93; Daly (R A), 17b; quartz keratophyre: Bayley, 89; spotted rocks: Bayley, 88a

## Minnesota—Continued.

*Petrology*—Continued.

- Southwestern Minn.: Hall (C W), 99  
 Titaniferous magnetites, northeastern Minn.: Broderick, 17  
 Trenton limestone, Minneapolis and St. Paul: Hall (C W), 89a  
 Vermilion district: Clements, 03; western part: Smyth (H L), 96a  
 Volcanic ash, Lake Superior: Winchell (N H), 96d

*Physical geology*.

- Clay pebbles, Princeton: Winchell (N H), 83a  
 Drift deposits, formation: Winchell (N H), 81c  
 Folding produced by glacial action: Sardeson, 06  
 Giant's kettles, Taylors Falls: Upham, 01d  
 Glacial erosion, Minneapolis: Sardeson, 05  
 Greensands, genesis: Winchell (N H), 11  
 Metamorphism of basic igneous rock: Grant (U S), 00a  
 Pigeon Point: Bayley, 93  
 St. Anthony Falls, recession: Winchell (N H), 78e

*Physiographic geology*.

- Baseleveling, Tertiary and Quaternary: Upham, 94m  
 Beltrami Island of Lake Agassiz: Upham, 93l  
 Buffalo River, meandering: Griggs, 06  
 Central Minn.: Hershey, 99e  
 Dalles of the St. Croix: Berkey, 98  
 Divided lakes: Griggs, 09  
 Drift: Upham, 84f  
 Drift, modified: Upham, 11; Saint Paul: Upham, 97a  
 Drift deposits, Minneapolis: Upham, 00b; St. Anthony Falls region: Winchell (N H), 78e  
 Drift sheets, characteristics: Sardeson, 11  
 Driftless area, northeastern Minn.: Grant (U S), 99c, d  
 General: Hall (C W), 84, 02, 03; Johnston (A W), 16; Upham, 96f; Winchell (N H), 73a, 84  
 Glacial deposits, Driftless Area: Sardeson, 97b  
 Glacial drift, Mississippi Valley: Upham, 06; Paleozoic fossils in: Sardeson, 01a  
 Glacial lakes: Winchell (N H), 01a  
 Glaciation, eastern Minn.: Upham, 84d  
 Itasca Lake region: Upham, 91h  
 Lake Itasca to Lake Pepin: Upham, 06  
 Little Falls: Upham, 84c  
 Mankato: Bechdolt, 89  
 St. Paul: Upham, 97g  
 Taylors Falls: Berkey, 97b  
 Glaciation and terminal moraines: Upham, 81  
 Gravel deposits, Little Falls: Upham, 88a  
 Ice movement on lakes: Atwood, 91  
 Itasca Co.: Culver, 94  
 Keewatin and Labradorian ice currents: Upham, 11a  
 Lake Agassiz: Upham, 82, 84b, 87, 96, 96e, 15  
 Lake Superior region: Lawson, 93b  
 Lakes: Hall (C W), 93; Martin Co.: Upham, 84e; with two outlets: Grant (U S), 97  
 Martin Co. glacial evidence in: Upham, 11b  
 Minneapolis, buried rock surface and preglacial river valleys: Soper, 15  
 Minneapolis-St. Paul district: Sardeson, 16



## Minnesota—Continued.

*Physiographic geology*—Continued.

- Minnehaha Falls, deserted gorge near: Grant (U S), 90  
 Minnesota Valley in ice age: Upham, 83  
 Moraines: Upham, 89g  
 Northeastern Minn.: Leverett, 17a; Upham, 94  
 Northwestern Minn.: Todd, 93, 94  
 Pleistocene: Leverett, 14; Saint Croix Valley: Upham, 00  
 Retreat of ice margin: Winchell (N H), 01e  
 St. Croix Dalles, age: Upham, 05b  
 St. Croix River: Elftman, 98a; Upham, 96q  
 Sangamon interglacial stage: Upham, 13a  
 Shore line of lakes, effect of ice on: Reagan, 11  
 Surface formations: Leverett, 17a; map: Leverett, 14a, 16; northwestern Minn.: Leverett, 15a  
 Vegetable remains in drift: Winchell (N H), 76b

*Underground water.*

- Artesian basin: Todd, 96c  
 Fargo quadrangle: Hall (C M), 05  
 General: Hall (C W), 89b, 04, 05  
 Minneapolis, artesian water conditions: Winchell (N H), 05; deep wells: Winchell (N H), 06b  
 Minneapolis and St. Paul water supply: Hall (C W), 11  
 Red River Valley: Winchell (N H), 78  
 Southern Minn.: Hall (C W), 11a

Minnesota River valley, origin: Warren (G K), 78  
 Miocene. *See* Tertiary.

*Miscellaneous. See also* Addresses.

- Chart, geological: Reid (H A), 81  
 Display of United States Geological Survey at Panama exposition: Anon, 15a  
 Ethics of petroleum geologist: Clapp (F G), 17a  
 First calcareous fossils: Daly (R A), 09  
 Geological diagnosis: Irving, 12  
 Geological structure, influence on history: Bechdolt, 81  
 Geological suggestions derived from a new arrangement of the elements: Emerson (B K), 10  
 Geological reports, illustrations: Ridgway, 13  
 Geology and engineering: Purdue, 13a  
 Geology applied to dams and reservoirs: Glenn (L C), 15b  
 Geology in iron ore exploration: Leith, 12  
 Geology in the twentieth century: Keyes, 01p  
 Geology under the planetesimal hypothesis: Fairchild, 04c  
 Hints to prospective geologists: Udden, 17c  
 Ice age, ignored theory of: Chamberlin (T C), 06b  
 Instituto Geologico de Mexico: Aguilera, 09d  
 Instrumental surveying needed in practical geology: Lyman, 09  
 Limeless ocean of pre-Cambrian time: Daly (R A), 07  
 Literature on geology: Condit, 16c  
 Manuscript, preparation: Wood (G M), 16  
 Mining, mineral, and geological law: Shamel, 07a  
 Mining terms, definitions: Merrill (F J H), 09a  
 Oceanic currents in successive geological periods: Shaler, 66a.  
 Organic synthesis, conditions of: Chamberlin (T C), 08

## Miscellaneous—Continued.

- Paleontologic monograph, mechanical part of: Burling, 10  
 Philosophy of geology and the order of the state: Clarke (J M), 17  
 Public interest in mineral resources: Smith (G O), 17a  
 Quartz as a geologic thermometer: Wright (F E), 09a  
 State geological surveys and practical geography: Carney, 08a  
 State surveys, work of: Mathews, 11  
 Succession of life: Cope, 74p  
 Theory and hypothesis in geology: Lahee, 09  
 United States Geological Survey, policy: Smith (G O), 12a  
 Wisconsin report, date: Billings, 62  
 Miohippus beds, John Day basin: Marsh, 94e  
 Mission Range, Mont.: Davis (W M), 16b  
 Mississippi.  
   General: Cornelius, 19; Nutt, 32a; Wailes, 45  
   Geological survey, history: Hilgard, 00; reports: Hilgard, 58, 60; Lowe, 14; Miss G S, 08  
   Mississippi embayment, geology: Dabney, 05  
   Natchez Bluff: Wailes, 47  
   Soil geology: Hilgard, 84d  
   Soils: Logan, 11, 13, 15  
*Economic geology.*  
   Atlanta-Greenville: Campbell (J L), 83  
   Cement resources: Crider, 05, 07; Eckel, 06, 13; Tombigbee Valley: Eckel, 05h  
   Clay: Crider, 06; Logan, 05a, 07, 08  
     northwestern Miss.: Eckel, 03b  
     pottery clays: Logan, 09  
   General: Harper, 57; Hilgard, 60; Lowe, 15; Wailes, 54  
   Iron: Lowe, 14a  
     Enterprise: Brainerd, 87  
     Marshall and Benton cos.: Lowe, 12  
   Lignite: Brown (C S), 07, 08  
   Limestone: Eckel, 06; Logan (W N), 16  
   Marls and limestones: Logan (W N), 16  
   Mineral resources: Crider, 06  
   Oil and gas possibilities: Crider, 17; Hopkins (O B), 16  
   Oktibbeha Co.: Logan, 04a  
   Structural materials: Logan, 11  
   Tombigbee Valley: Eckel, 05h  
*Historical geology.*  
   Appomattox formation: McGee, 90, 91f  
   Atlanta-Greenville: Campbell (J L), 83  
   Bluff formation, Natchez: Binney, 46  
   Borings: Wilson (E H), 82; Mississippi River: Hilgard, 84  
   Citronelle formation: Matson, 16  
   Correlation of Jackson and Vicksburg deposits: Cooke (C W), 18a  
   Cretaceous: Thornton, 58  
   Cretaceous tongues: Stephenson, 17  
   Cretaceous-Eocene contact: Stephenson, 15  
   Eocene: Berry, 16a; Conrad, 47; Walnut Hills: Conrad, 46d  
   General: Crider, 06, 06b, 17; Harper, 57; Hilgard, 60; Johnson (L C), 05; Lieber, 54; Logan (W N), 16; Lowe, 15; Smith (E A), 72; Wailes, 54



**Mississippi—Continued.***Historical geology—Continued.*

- Grand Gulf formation: Johnson (L C), 89  
 Lafayette formation: Berry, 11h; Shaw (E W), 15e; Mabry, 98  
 Lignitic stage: Harris, 97  
 Loess loam, northern Miss.: Mabry, 98  
 Loess of Natchez: Shimek, 02  
 Middleton formation: Safford, 92a, b  
 Midway stage: Harris, 96  
 Mississippi bottom: Smith (E A), 72  
 Mississippi River: Little, 83  
 Natchez: Dickeson, 45; Gale, 47; Lyell, 47b  
 Natchez formation: Chamberlin (T C), 96c  
 Northern Miss.: Bolton, 49  
 Oktibbeha Co.: Logan, 04a  
 Oligocene: Maury, 02  
 Pliocene history, northern and central Miss.: Shaw (E W), 18  
 Post-Eocene formations: Smith (E A), 06a  
 Quaternary formations: Hilgard, 66  
 Ripley group: Johnson (L C), 84  
 Shell Bluff group: Hilgard, 66a  
 Tertiary: Heilprin, 84a; Hilgard, 67, 86; Langdon, 86  
     correlation: Vaughan, 18d  
     Vicksburg: Conrad, 52  
     Warren Co.: Conrad, 46c  
 Tertiary and Grand Gulf: Meyer (O), 86a  
 Tombigbee Valley: Eckel, 05h  
 Vicksburg region: Casey, 05; Conrad, 66g; Hopkins (O B), 16; Lyell, 47c; Meyer (O), 85
- Mineralogy.*  
 Meteorite, Oktibbeha Co.: Cohen, 92; Taylor (W J), 57a
- Paleontology.*  
 Arcas: Sheldon, 17  
 Bluff formation, Natchez: Binney, 46  
 Catahoula sandstone flora: Berry, 16e  
 Cretaceous: Conrad, 60b; Gabb, 61d  
     Mollusca: Gabb, 61e  
     Tippah Co.: Conrad, 58  
 Cretaceous and Tertiary, lists: Tuomey, 58a  
 Crinoidea: Springer, 11a  
 Echinoids, Ripley group: Slocum, 09; Tertiary: Stefanini, 12  
 Engelhardtia, Eocene: Berry, 11i  
 Eocene: Aldrich, 08a, 11; Berry, 16a; Conrad, 60b; Meyer (O), 87a  
     Astarte: Aldrich, 10  
     Jackson: Conrad, 55a  
     Mollusca: Aldrich, 10a; Meyer (O), 87; Whitefield, 65; Enterprise: Conrad, 65e  
 Eochras eocenica, Holmes Co.: Berry, 15d  
 Felis atrox: Leidy, 53a  
 Fish otoliths: Koken, 88  
 Fulgur: Conrad, 53  
 General: Wailes, 54  
 Goniopteris claborniana, Lisbon formation: Berry, 17b  
 Human remains, Natchez: Leidy, 89c  
 Mammalia, Claiborne Co.: Leidy, 59d; Natchez: Dickeson, 46  
 Meridian, plants: Berry, 17  
 Mollusca: Conrad, 71b; Cretaceous: Tuomey, 54  
 Nipadites, Eocene: Berry, 14e

**Mississippi—Continued.***Paleontology—Continued.*

- Oktibbeha Co.: Logan, 04a  
 Otoliths, Jackson: Meyer (O), 89  
 Petrified forest: Brown (C S), 13  
 Reptile, Columbus: Leidy, 66  
 Tapirus haysii, Natchez: Leidy, 52j  
 Tertiary, Newton and Wautubee: Meyer (O), 86c  
     Gastropoda, Red Bluff: Aldrich, 94  
     Mollusca: Aldrich, 85a, b, 86, 86a, 03  
     plants: Lesquereux, 69a  
 Ursus, Natchez: Leidy, 53d; Wortman, 83a  
 Vertebrate: Dickeson, 45  
 Vicksburg Mollusca: Casey, 03; Conrad, 47, 49; Meyer (O), 86b  
 Zamia, Meridian: Berry, 16g  
 Zeuglodon: Koch (A C), 57; Natchez: Bartlett, 46
- Physical geology.*  
 Waste lands, a study of erosion: Lowe, 10
- Physiographic geology.*  
 General: Hilgard, 84d; Lowe, 15  
 Gulf coastal plains: Sutherland, 03  
 Northern Miss.: Bolton, 49  
 Oktibbeha Co.: Logan, 04a  
 Pliocene history, northern and central Miss.: Shaw (E W), 18
- Underground water.*  
 General: Crider, 06b; Johnson (L C), 04, 05; Logan, 05, 05b; Lowe, 15
- Mississippi bottom: Smith (E A), 72  
 Mississippi embayment, geology: Dabney, 05; Griswold, 95a; Harris, 02a; Holmes (N), 75  
 Mississippi River: Forshey, 78; age: Farnsworth, 01; blue clay: Little, 83; lower, origin: Griswold, 95a; phenomena at mouth of: Lawes, 11; sand waves: Hider, 83  
 Mississippi River valley, origin: Warren (G K), 78  
 Mississippi Valley: Emerson (F V), 12; Foster, 69; James (E), 22; Nicollet, 41; Nuttall, 21a; Olshausen, 53; Owen (D D), 43c  
 Driftless Area: Chamberlin (T C), 85a  
 Lead regions: Locke, 42  
 Savanna-Davenport: Carman, 09  
 Stratigraphy: Locke, 41a  
 Upper, hydro-geology: Mead (D W), 94; physiographic development: Hershey, 97b
- Mississippian. *See* Carboniferous.  
 Mississippian formations, cooperative investigation of: DeWolf, 13; western Kentucky: Butts, 17b  
 Mississippian section: Keyes, 92a  
 Mississippian series, classification: Keyes, 92, 98f; Weller (S), 98c; Mississippi Valley: Weller (S), 14  
 Mississippian chert of St. Louis area: Barton, 18  
 Missouri.  
     Analyses, fuels and iron ores: Chauvenet, 73, 74  
     Bibliography: Keyes, 96a; Sampson, 90  
     Cass Co.: Broadhead, 67  
     Copper and glacial striae, central Mo.: Kirkpatrick, 91  
     General: King (H), 49; Marbut, 04; Swallow, 67a, 71, 77



## Missouri—Continued.

- Geological survey: Trowbridge, 83  
 history: Broadhead, 86, 01; Pumpelly, 73; Winslow, 94b  
 organization and results: Keyes, 95f  
 reports: Buckley, 03a; Buehler, 09; Gallaher, 98, 01; Hager, 71; Keyes, 95e; Swallow, 55, 57, 59, 61; Winslow, 90, 91  
 Greene Co.: Shepard, 15; Swallow, 83  
 Hypsometric map: Keyes, 95m  
 Mapping: Winslow, 92a  
 Native silver in glacial material, Columbia: Tarr (W A), 15a  
 Official geological reports: Sampson, 93  
 Ozark region: Marbut, 10  
 Pettis Co.: Sampson, 82  
 St. Louis region: Hus, 08  
 Soils: Broadhead, 84c; Ozark region: Marbut, 10

*Economic geology.*

- Adair Co.: Broadhead, 74  
 Andrew Co.: Broadhead, 74  
 Barite: Tarr (W A), 17a, 18; Wittich (L L), 12; Washington Co.: Steel, 10  
 Barton Co.: Broadhead, 74  
 Bates Co.: Broadhead, 74, 83a  
 Benton Co.: Broadhead, 80  
 Bevier sheet: Gordon (C H), 93  
 Bitumen: Broadhead, 75b  
 Bituminous rocks: Broadhead, 03  
 Building and ornamental stones: Keyes, 96j  
 Building stone: Hawes, 84  
 Building stones, clays, and sands of Iron, St. Francois and Madison cos.: Ladd, 90  
 Calamine deposits, Granby: Ruhl, 08  
 Calhoun sheet: Marbut, 98  
 Cape Girardeau Co.: Shumard (B F), 73  
 Cedar Co.: Broadhead, 74  
 Cement materials: Buehler, 07  
 Clark Co.: Shumard (B F), 73  
 Clay: Keyes, 97g; Ladd, 96; Wheeler (H A), 96, 98, 05  
 Bollinger Co., kaolin deposits: Orton (jr), 06  
 geologic occurrence: Keyes, 96b  
 St. Louis district: Fenneman, 07, 11  
 Washington Co.: Woolford, 48  
 Clays and building stones, west central Mo.: Ladd, 91  
 Clinton sheet: Marbut, 98  
 Coal: Bain, 02a; Broadhead, 73; Bush, 05, Hinds, 10; Winslow, 91a, 93b  
 Adair Co.: Broadhead, 74  
 Barton Co.: Broadhead, 74  
 Bates Co.: Broadhead, 74, 83a  
 Bevier sheet: Gordon (C H), 93  
 Henry Co., age: White (D), 97  
 Higginsville sheet, Lafayette Co.: Winslow, 92  
 Howard Co.: Broadhead, 74; Norwood (C J), 74b  
 Lafayette Co.: Winslow, 90a  
 Leavenworth quadrangle: Hinds, 17  
 Lincoln Co.: Potter, 73  
 Morgan Co.: Griffith, 04  
 northeastern Mo.: Greene (F C), 14  
 northern Mo.: Hinds, 11

## Missouri—Continued.

*Economic geology—Continued.*

- Coal: Putnam Co.: Norwood (C J), 74b  
 Smithville quadrangle: Hinds, 17  
 southern Mo.: Hughes, 11  
 Vernon Co.: Broadhead, 74  
 Coal seams, depth: Broadhead, 73c  
 Cole Co.: Broadhead, 73g, 74  
 Cooper Co.: Swallow, 55b  
 Copper: Bain, 05c, e  
 Ste. Genevieve district: Gage, 77; Nicholson, 82  
 Shannon Co.: Williams (C P), 77  
 Crawford Co.: Shumard (B F), 73  
 Daviess Co.: Broadhead, 74  
 Economic geology map: Parker (N H), 65  
 Fire clays: Wheeler (H A), 05  
 Franklin Co.: Shumard (B F), 55  
 General: Branson, 18a; Broadhead, 74, 01a, Buehler, 09; Gallaher, 00, 00a; King (H), 52; Prout, 48a; Swallow, 55a, 67b, 74; Wilber, 70; Williams (C P), 77  
 Glass-sand deposits: Burchard, 06a, 07d  
 Granby area: Buckley, 07; Perkins (E T), 07  
 Granite: Keyes, 95o; Tarr (W A), 14a  
 Greene Co.: Shepard, 98, 15; Smith (O M), 05  
 Hickory Co.: Broadhead, 80  
 Higginsville sheet, Lafayette Co.: Winslow, 92  
 Howard Co.: Broadhead, 74; Norwood (C J), 74b  
 Huntsville quadrangle: Marbut, 98  
 Iron: Chauvenet, 86; Crane (G W), 12; Credner, 66a; Gage, 73; King (H), 51; Nason, 92; Pumpelly, 76a; Schmidt, 73, 74b; Shepard, 40b; Thompson (R O), 74a; Williams (C C), 72; Williams (C P), 77; Wittich (L L), 12a  
 Benton and Hickory cos.: Broadhead, 80  
 in Carboniferous rocks: Broadhead, 78  
 Ozark region: Robertson (J D), 93  
 southeastern Mo.: Moore (P N), 74  
 Iron Mountain: Frazer, 74; Hodge (J T), 42; Rath, 84f; Schmidt, 73; Shepard, 52f; Winslow, 94a  
 Iron Mountain sheet: Winslow, 94a  
 Jackson Co.: McCourt, 17  
 Jasper Co.: Broadhead, 74; Carterville: Broadhead, 84  
 Jefferson Co.: Shumard (B F), 73  
 Joplin deposits: Bain, 16; origin: Bain, 01a, 02  
 Joplin district: Boyd (W W), 12; Buckley, 07b; Brittain, 07; Clerc, 07; Herrick (R L), 07; Kitson, 17; Ruhl, 08a; Smith (W S T), 07a; Wittich (L L), 10; structural features: Bain, 05f; Siebenthal, 05  
 Joplin zinc belt, migrations: Keyes, 09h  
 Laclede Co.: Shumard (B F), 73  
 Lead: Bomford, 22; Bringier, 21; Buckley, 08, 09b, 10; Crook, 04a; Finlay (J R), 08; Gage, 74a; Hodge (J T), 42; Jenney, 94; Keyes, 08d, 09g; Schoolcraft, 19; Thompson (R O), 74; Williams (C P), 77; Winslow, 93, 94, 95a  
 Benton and Hickory cos.: Broadhead, 80  
 central Mo.: Schmidt, 74a  
 Cole Co.: Broadhead, 73g  
 Granby area: Buckley, 06; Perkins (E T), 07



## Missouri—Continued.

*Economic geology*—Continued.

Lead: Joplin district: Brittain, 07; Buckley, 07b; Buchler, 17; Clerc, 07; Hedburg, 98; Herrick (R L), 07; Kitson, 17; Ruhl, 08a; Smith (W S T), 03a, 07a; Wittich (L L), 10; Wright (C A), 13

La Motte: Troost, 27a

Madison Co.: Johnson (R D O), 06

Miami district: Heap, 13

Newburg district: Lee (W), 11

Ozark region: Bain, 01; Buckley, 09a, 11, 11a; Buehler, 17; Johnson (W H), 01; Keyes, 09c, 10a, c

St. Francois and Washington cos.: Buckley, 09

Ste. Genevieve: Meade (W), 14

southeastern Mo.: Austin, 04; Broadhead, 76; Cantwell, 14; Gage, 74, 75; Nason, 02, 14; Ruhl, 09; Wheeler (H A), 04, 10a; Winslow, 96

southern Mo.: Hughes, 11

southwestern Mo.: Garrison, 08; Heap, 13; Schmidt, 74, 75

Springfield district: Smith (O M), 05

Washington Co.: Ball (S H), 16

Lead and zinc deposits: Buckley, 08, 09a, b, 11a; Finlay (J R), 08; Keyes, 08d; 09c, 10a; Robertson (J D), 95; Siebenthal, 11

Granby area: Buckley, 06

Joplin district: Wright (C A), 13

southwestern Mo.: Clerc, 87, 07; Stevens (W B), 00

Leavenworth quadrangle: Hinds, 17

Lexington sheet: Marbut, 98

Lime and cement resources: Buehler, 07

Limestone, Joplin district: Smith (W S T), 07a

Lincoln Co.: Potter, 73

Linn Co.: Broadhead, 74

Livingston Co.: Broadhead, 73a

Macon Co.: Broadhead, 73d

Madison Co.: Broadhead, 74; Norwood (J G), 74

Manganese: Harder, 10

Marble, southeastern Mo.: Broadhead, 82

Maries Co.: Broadhead, 73d

Marion Co.: Swallow, 55b

Miller Co.: Ball (S H), 03; Meek, 73c

Mine la Motte area: Frazer, 74; Keyes, 95h

Mineral resources: Buehler, 18a; southwestern Mo.: Swallow, 57a

Mineral waters: Schweitzer, 92

Mines of Franklin, Jefferson, Washington, St. Francis and Madison cos.: Litton, 55

Moniteau Co.: Meek, 55; Van Horn, 05

Morgan Co.: Marbut, 08; Meek, 73c

Natural gas: Ashburner, 87e

Newburg district: Lee (W), 11

Oil and gas about St. Louis: Wheeler (H A), 10

Oil and gas possibilities, Belton area: Wilson (M E), 18

Ore deposits, origin: Meyer (F C), 91

Ore localization in Ozark region: Keyes, 10c

Osage Co.: Broadhead, 73d

Osage River region: King (H), 40

Ozark Co.: Shumard (B F), 73

## Missouri—Continued.

*Economic geology*—Continued.

Ozark region: Buckley, 09a, 11a; Buehler, 17; Featherstonhaugh, 35a; Haworth, 00; Schoolcraft, 53

Perry Co.: Shumard (B F), 73

Petroleum, Ray and Carroll cos.: Shumard (B F), 66; St. Louis quadrangle: Fenneman, 11

Phelps Co.: Shumard (B F), 73

Pike Co.: Rowley, 08

Pulaski Co.: Shumard (B F), 73

Putnam Co.: Norwood (C J), 74c

Randolph Co.: Broadhead, 73d

Richmond quadrangle: Marbut, 98

Road materials: Buckley, 07d

Rocks admitting polishing: Broadhead, 73b

Rolla quadrangle: Lee (W), 14

Ste. Genevieve Co.: Shumard (B F), 59b, 73

St. Louis Co., clay, stone, lime, and sand: Ladd, 90a

St. Louis quadrangle: Fenneman, 11

Saline Co.: Meek, 73c

Sand and gravel resources: Dake, 18; St. Louis; quadrangle: Fenneman, 11

Shannon Co.: Williams (C P), 77

Shelby Co.: Broadhead, 73d

Smithville quadrangle: Hinds, 17

Southeastern Mo.: Kemp, 87a; Nicollet, 43c Phillips, 59

Southwestern Mo.: Case, 77a; Schmitz, 99

Southwest Pacific Railroad line: Swallow, 59a

Stone: Buckley, 04

Sullivan Co.: Broadhead, 74

Tallow clays: Seamon, 90a

Tripoli: Plumb, 14; Seneca: Hovey, 94d; Nelson (G), 09; Siebenthal, 08b

Vernon Co.: Broadhead, 74; Norwood (C J), 74a

Warren Co.: Broadhead, 73d

Washington Co., barite district: Tarr (W A), 18

Wright Co.: Shumard (B F), 73

Zinc: Bain, 04g; Buckley, 09b; Crook, 04a; Hedburg, 02; Hillebrand, 92; Jenney, 94; Keyes, 09g; Williams (C P), 77; Winslow, 93, 94, 95a

Jefferson Co.: Troost, 27a

Joplin district: Buehler, 17; Garrison, 00; Hedburg, 98; Kitson, 17; Smith (W S T), 03a; Steele, 00

Ozark region: Bain, 01; Johnson (W H), 01

southwestern Mo.: Raymond, 79b; Schmidt, 74, 75; Schmitz, 99; Seamon, 90; origin: Cox (G H), 16a

Webb City, Heinrich, 93

Zinc and lead deposits: Garrison, 08; Joplin district: Siebenthal, 15

*Historical geology*.

Adair Co.: Broadhead, 74

Alexandrian series: Keyes, 14, 15e; Savage, 13, 13a, 14a

Andrew Co.: Broadhead, 74

Archean: Broadhead, 82b; Haworth, 88

Atchison Co.: Broadhead, 73a

Barite districts: Tarr (W A), 18

Barton Co.: Broadhead, 74

Basal delimitation of Carboniferous: Keyes, 92c



## Missouri—Continued.

*Historical geology*—Continued.

- Bates Co.: Broadhead, 74, 83a  
 Belcher's artesian well, St. Louis: Anon, 53  
 Belton area: Wilson (M E), 18  
 Benton Co.: Broadhead, 80  
 Bethany limestone: Bain, 98f; Keyes, 96h  
 Bevier sheet: Gordon (C H), 93  
 Boone Co.: Broadhead, 98  
 Borings: McCoy, 13  
   Kansas City: Thorne, 78, 79  
   St. Louis: Broadhead, 75a; Litton, 57; Phillips (J V), 77  
 Buchanan Co.: Broadhead, 73a  
 Calhoun sheet: Marbut, 98  
 Cambrian: Broadhead, 93; Winslow, 93a; St. Francois Mountains: Keyes, 01d  
 Camden Co.: Hahatonka district: Scherer, 05  
 Cap-au-Grés fault: Keyes, 17j  
 Cape Girardeau Co.: Shumard (B F), 63d, 73  
 Carboniferous: Keyes, 97b; Ozark uplift: Ball (S H), 04  
 Cedar Co.: Broadhead, 74  
 Central Mo.: Schmidt, 74a  
 Chert: Hovey, 94a  
 Chouteau group: Rowley, 89  
 Chouteau limestone, terranal affinities: Keyes, 16e  
 Clark Co.: Shumard (B F), 73  
 Clay Co.: Broadhead, 73a  
 Clinton sheet: Marbut, 98  
 Coal Measures: Broadhead, 66, 95; White (D), 99; Winslow, 91a, 92c; thickness: Broadhead, 77a  
 Cole Co.: Broadhead, 73g, 74  
 Columbia, section: Branson, 13a, 17  
 Cooper Co.: Swallow, 55b  
 Copper areas: Bain, 05c  
 Crawford Co.: Shumard (B F), 73  
 Crystalline rocks: Haworth, 90, 95; age and origin: Haworth, 91  
 Daviess Co.: Broadhead, 74  
 Des Moines series: Keyes, 97e  
 Devonian: Keyes, 02  
   central Mo.: Branson, 15b; Greger, 09  
   northern Mo.: Broadhead, 96  
   Pike Co.: Branson, 14  
   southeastern Mo.: Weller, 16c  
   southwestern Mo.: Hershey, 95c  
 Devonian limestone breccia, southwestern Mo.: Hershey, 95a  
 Devonian-Carboniferous unconformity: Keyes, 13e  
 Drift, St. Louis: Wheeler, 95  
 Edgewood limestone, Pike Co.: Rowley, 16  
 Eureka Springs-Harrison quadrangles: Purdue, 16  
 Franklin Co.: Shumard (B F), 55  
 General: Branson, 18a; Broadhead, 74, 85; Buckley, 04; Dake, 18; Gallaher, 98, 00, 00a, 01; Hall, 43c; Hodge (J T), 42; Jenney, 94; Keyes, 94c, 96b; King (H), 44, 51, 52; Maughas, 53; Swallow, 55a, 58, 67b, 73, 74; Winslow, 94  
 Geologic formations, table: Shepard, 04a  
 Geologic history: Winslow, 95  
 Geologic map: Mo B G, 12

## Missouri—Continued.

*Historical geology*—Continued.

- Girardeau and Edgewood formations: Savage, 10b  
 Glen Park section: Weller, 06  
 Granby area: Buckley, 06  
 Grassy Creek shale: Greger, 18  
 Graydon sandstone, southwestern Mo.: Babcock, 04  
 Greene Co.: Shepard, 98, 05c, 15; Smith (O M), 05  
 Hamilton, Callaway Co.: Rowley, 93a  
 Hannibal formation, Greene Co.: Park, 05a  
 Henry Co., coal beds: White (D), 97  
 Higginsville sheet, Lafayette Co.: Winslow, 92  
 Holt Co.: Broadhead, 73a  
 Howard Co.: Broadhead, 74; Norwood (C J), 74b  
 Huntsville quadrangle: Marbut, 98  
 Iron Mountain: Rath, 84f; Schmidt, 73  
 Iron Mountain sheet: Winslow, 94a  
 Iron regions: Nason, 92; Schmidt, 73  
 Jackson Co.: McCourt, 17  
 Jacobs Cavern, McDonald Co.: Gould, 04b  
 Jasper Co.: Broadhead, 74, 78b; Carterville: Broadhead, 84; Coal Measures: Norwood (C J), 74  
 Jefferson Co.: Shumard (B F), 73  
 Joplin district: Smith (W S T), 07a  
 Kinderhook formations: Weller, 01b; lower: Branson, 18b; Webster Co.: Weller (S), 99  
 Kinderhook group: Moore (R C), 17a  
 Laclede Co.: Shumard (B F), 73  
 Lead regions: James (E), 27; Schoolcraft, 21b  
 Leavenworth quadrangle: Hinds, 17  
 Lexington sheet: Marbut, 98  
 Limestone conglomerate, St. Francis Co.: Nason, 01  
 Lincoln Co.: Potter, 73  
 Linn Co.: Broadhead, 74  
 Livingston Co.: Broadhead, 73a  
 Locss, St. Joseph: Owen (L A), 04  
 Louisiana region: Keyes, 92d, 97f  
 Macon Co.: Broadhead, 73d; McGee, 88b  
 Madison Co.: Broadhead, 74; Norwood (J G), 74  
 Magnesian limestones, Cambrian age: Keyes, 02b  
 Magnesian series, Ozark region: Nason, 93  
 Maries Co.: Broadhead, 73d  
 Marion Co.: Swallow, 55b  
 Miller Co.: Ball (S H), 03; Meek, 73c  
 Mine la Motte area: Keyes, 95h  
 Mississippi River section, St. Louis to Commerce: Shumard, 55  
 Mississippian: Keyes, 95n; Sedalia: Sampson, 88  
 Moniteau Co.: Meek, 55; Van Horn, 05  
 Morgan Co.: Marbut, 08; Meek, 73c  
 Newburg district: Lee (W), 11  
 Nodaway Co.: Broadhead, 73a  
 Northeastern Mo.: Greene (F C), 14  
 Northern Mo.: Hawn, 55  
 Northwestern Mo.: Broadhead, 73  
 Osage Co.: Broadhead, 73d  
 Osage River region: King (H), 40  
 Ozark Co.: Shumard (B F), 73



## Missouri—Continued.

*Historical geology—Continued.*

- Ozark Mountains: Keyes, 95g  
 Ozark region: Adams (G I), 01; Broadhead, 89, 98; Buehler, 17; Crane (G W), 12; Featherstonhaugh, 35a; Hershey, 99c; Keyes, 95k; Carboniferous: Keyes, 95k  
 Ozark sandstones: Marbut, 03  
 Ozark series: Broadhead, 91, 93, 93a, b; Nason, 93b; classification: Winslow, 93a  
 Paleogeography of St. Peter time: Berkey, 06  
 Palozoic: Broadhead, 93b, 94  
 Paleozoic eruptive: Winslow, 95b  
 Parallelism of eastern and western interior coal fields: Keyes, 17g  
 Pegmatite Hill, Camden Co.: Ruhl, 04a  
 Pennsylvanian series: Hinds, 15  
 Perry Co.: Shumard (B F), 73  
 Pettis Co.: Sampson, 82  
 Phelps Co.: Shumard (B F), 73  
 Pike Co.: Rowley, 08  
   Burlington: Rowley, 91b  
   Carboniferous: Rowley, 91  
   Ordovician: Rowley, 91a  
 Pilot Knob: Pumpelly, 73a  
 Platte Co.: Broadhead, 73a  
 Porphyries, age: Broadhead, 76a, c  
 Porphyry hills, southeastern Mo., age: Harrison (E), 68  
 Providence, geologic section: Stewart (A), 96  
 Pulaski Co.: Shumard (B F), 73  
 Putnam Co.: Norwood (C J), 74c  
 Randolph Co.: Broadhead, 73d  
 Richmond quadrangle: Marbut, 98  
 Rolla quadrangle: Lee (W), 14  
 Saccharoidal sandstone: Broadhead, 04c  
 Ste. Genevieve Co.: Shumard (B F), 59b, 73; Worthen, 60a  
 St. Francis Co.: Nason, 01a; and Washington Co.: Buckley, 09  
 St. Louis: Shumard (B F), 55; Wheeler, 95a  
 St. Louis area, Mississippian chert: Barton (D C), 18  
 St. Louis quadrangle: Fenneman, 11  
 Saline Co.: Meek, 73c  
 Schuyler Co.: Norwood (C J), 74c  
 Shannon Co.: Williams (C P), 77  
 Shelby Co.: Broadhead, 73d  
 Smithville quadrangle: Hinds, 17  
 Southeastern Mo.: Broadhead, 76; Marbut, 02; Phillips (J V), 59; Weller, 14a  
 Southern Mo.: Hughes, 11  
 Southwestern Mo.: Schmidt, 74; Schmitz, 99  
 Southwest Pacific Railroad line: Swallow, 59a  
 Springfield district: Park, 05  
 Sullivan Co.: Broadhead, 74  
 Superficial deposits along the Mississippi: Fowke, 06, 08  
 Table of formations: Keyes, 14c, 15o  
 Vernon Co.: Broadhead, 74; Norwood (C J), 74a  
 Warren Co.: Broadhead, 73d  
 Washington Co., barite district: Tarr (W A), 18  
 Winoka gravels: Hays, 04; Park, 04  
 Wright Co.: Shumard (B F), 73

## Missouri—Continued.

*Mineralogy.*

- Ankerite, Phelps Co.: Rogers (A F), 99a  
 Barite, Morgan Co.: Broadhead, 77b; Pettis Co.: Luedeking, 91  
 Blende in lignite: Wheeler, 95a  
 Calcite, Joplin: Gratacap, 00; Pogue, 09  
 Catalog of minerals: Leonhard, 84; Wheeler, 95b  
 Central Mo.: Schmidt, 74a  
 Diasporite, Rosebud: Wherry, 17n  
 Ferro-goslarite, Jasper Co.: Wheeler, 91  
 General: Broadhead, 74, 01a  
 Glauconite, southeastern Mo.: Ross, 16  
 Göthite, Adair Co.: Broadhead, 77b  
 Granby area: Buckley, 06  
 Greenokite, Joplin: Cornwall, 02  
 Iron, native, in coal measures, Missouri: Allen (E T), 97  
 Joplin minerals: Brittain, 08; Hawkins, 18b; Rogers (A F), 00c, 02d  
 Leadhillite, Granby: Pirsson, 94b; pseudomorphs, Granby: Foote (W M), 95  
 Limonite pseudomorphous after calcite: Haworth, 92  
 Melanite: Haworth, 92  
 Meteorite, Billings: Ward (H A), 05  
   Butler, Bates Co.: Broadhead, 75c; Smith (J L), 77  
   Cape Girardeau: Dana (E S), 86c  
   central Mo.: Preston (H L), 00a  
   Forsyth: Shepard, 60  
   Little Piney: Shepard, 40  
   Perryville: Merrill (G P), 12b  
   Ste. Genevieve: Ward (H A), 01  
   St. Francis Co.: Cohen, 92  
   southeastern Mo.: Shepard, 69  
   Taney Co.: Kunz, 87d  
   Warren Co.: Broadhead, 77c  
   Warrenton: Smith (J L), 77d  
 Millerite, St. Louis: Leonhard, 84a  
 Phosphorescent calcites: Hadden, 06a  
 Pickeringite: Broadhead, 74a  
 Southwestern Mo.: Schmidt, 74  
 Zinc blende, Joplin: Garrison, 07c
- Paleontology.*  
 Alexandrian series, fauna: Savage, 13a  
 Asaphus: Green (J), 38b  
 Auburn chert fauna: Branson, 09  
 Benton Co., Mammalia: Chaloner, 43  
 Bryozoa, Coal Measures: Rogers (A F), 00b  
 Burlington crinoid: Rowley, 90  
 Burlington fauna, Louisiana: Rowley, 00b  
 Cambrian, Ozark region: Shumard (B F), 63; St. Francois Co.: Beccher, 01a  
 Carboniferous: Swallow, 60, 63  
   Cephalopoda: Hyatt, 91  
   Echinodermata: Miller (S A), 89b, 90  
   flora: White (D), 93  
   Invertebrata: Gurley (W F E), 83, 84  
 Catalog: Hambach, 90  
 Cephalopoda, Carboniferous: Miller (S A), 92a  
 Chouteau fauna, origin: Williams (H S), 96  
 Chouteau fossils: Rowley, 93  
 Coal Measures: Norwood, 73; Shumard (B F), 58b; flora: White (D), 99



## Missouri—Continued.

*Paleontology*—Continued.

- Crinoidea:** Meek, 65g  
**Carboniferous:** Miller (S A), 90b  
 Kansas City: Butts, 98  
**Keokuk group:** Miller (S A), 80a  
**Mississippian:** Miller (S A), 91, 96a, b, 97  
**Crinoids, blastoids, and cystoids:** Rowley, 00  
**Devonian:** Swallow, 60, 63  
 brachiopod with original color markings:  
 Greger, 08  
 fishes: Branson, 13, 14  
**Devonian and Mississippian fossils:** Rowley, 93b, 95  
**Dicotyles:** Le Conte (J L), 52a  
**Drift:** Broadhead, 73f  
**Echinodermata:** Rowley, 05  
 Mississippian: Hambach, 84a  
 Silurian: Rowley, 04  
**Eurypterid, St. Francois Co.:** Beecher, 01b  
**Fern Glen fauna:** Weller, 09, 09c  
**Footprints, Kansas City:** Butts, 91  
**General:** Branson, 18a; Shumard (B F), 55  
**Grassy Creek shale:** Greger, 18  
**Hamilton crinoids and brachiopods:** Rowley, 94  
**Horse:** Broadhead, 73e  
**Ichthyosaurus:** Harlan, 34b, d  
**Invertebrata:** Keyes, 94c, d  
**Kansas City, Aesicrinus:** Butts, 91a; list of fossils: Lykins, 84  
**Kinderhook fauna:** Keyes, 92d  
 Glen Park: Weller (S), 06  
 Webster Co.: Weller (S), 99  
**Lingulella, Mine LaMotte:** Meek, 71g  
**Louisiana:** Keyes, 97b, f  
**Mastodon:** Broadhead, 81; Horner, 40, 40a; Koch, 39, 57a  
 Benton Co.: Hoy, 71; Whipple, 44  
 Galena: Desor, 50c  
 Jackson Co.: Ballard, 80  
 Kansas City: West, 77  
**Melonites multipora, St. Louis:** Norwood, 46b; Roemer, 55  
**Mississippian faunas, northeastern Mo.:** Rowley, 02; Phelps Co.: Bridge, 17  
**Mollusca, Mississippian:** Meek, 71d  
**Naticopsis, growth stages:** Girty, 12a  
**Omphalophloios:** White (D), 98  
**Orycterotherium, Benton Co.:** Harlan, 43  
**Paleozoic Invertebrata:** Miller (S A), 93, 96c; Rowley, 01  
**Pennsylvanian, flora:** White (D), 15; Invertebrata: Girty, 15d  
**Pike Co.:** Rowley, 08; Echinodermata: Rowley, 91c, d  
**Pisces, Carboniferous:** Leidy, 57f  
**Pleistocene Mollusca, Callaway Co.:** Greger, 16  
**Pleurotomaria, Devonian, Boone Co.:** Broadhead, 96  
**Post-Pliocene shells, Providence and Lupus:** Sampson, 14  
**Productus, St. Louis:** Prout, 57  
**Proetus, Chouteau limestone:** Vogdes, 97  
**St. Louis:** Owen (D D), 42  
**Scyphocrinus slab:** Bassler, 13a  
**Sedalia trilobites:** Vogdes, 92a

## Missouri—Continued.

*Paleontology*—Continued.

- Southwestern Mo., Quaternary Mammalia:**  
 Lewis (J L), 80  
**Springfield, succession of faunas:** Weller, 95a  
**Syringothyris, Devonian brachiopod:** Schuchert, 10c  
**Taeniopteris:** White (D), 93a  
**Trilobites, Kansas City:** Hare, 91; Mississippian, Sedalia: Vogdes, 86a  
**Vertebrata:** Keyes, 94d; Koch (A C), 40  
*Petrology.*  
**Archean:** Haworth, 88  
**Chert:** Hovey, 94a; origin: Dean (R S), 18  
**Crystalline rocks:** Haworth, 95; age and origin: Haworth, 91  
**Geodes, Keokuk beds:** Van Tuyl, 16f  
**Iron Mountain:** Rath, 84f  
**Jasperoid, southwestern Mo.:** Cox (G H), 16a  
**Ozarks, granites and porphyries:** Keyes, 96c  
**Paleozoic eruptive:** Winslow, 95b  
**Prismatic sandstone:** Haworth, 92a  
*Physical geology.*  
**Boulders of decomposition:** Spencer (J W), 87c  
**Chert, origin:** Dean (R S), 18  
**Deformation, Quaternary, southeastern Mo.:** Shaw (E W), 15d  
**Earthquakes, Charleston, 1895:** Purdue, 96  
 New Madrid: Fuller, 05t, 06i, j, 12; Sampson, 13  
 1917, April 9: Finch (R H), 17; Paige, 17  
**Granitic masses, disintegration:** Keyes, 95p  
**Joplin district, structural features:** Bain, 05f  
 Siebenthal, 05  
**King-Ritter fault, Springfield area:** Ruhl, 04  
**Loess, upland, formation of:** Hershey, 00a  
**Marble Cave:** Emery, 85  
**Ozark Mountains:** Keyes, 95g  
**Seismology, St. Louis University:** Goesse, 11  
**Striae, Kansas City:** Case, 94a  
*Physiographic geology.*  
**Bevier sheet:** Gordon (C H), 93  
**Bluffs, Missouri River:** Owen (L A), 01  
**Boulders, Tuscumbia:** Wright (G F), 03e  
**Columbia region:** Von Engeln, 12  
**Cote Sans Dessein:** Marbut, 98a  
**Crowleys Ridge:** Marbut 95  
**Drift deposits:** Broadhead, 73e, f, 76b  
 central Mo.: Spencer (J W), 87d  
 Columbia: Spencer (J W), 87d  
**Drainage changes, Kansas City:** West, 79  
**General:** Branson, 18a; Loughridge, 84; Marbut, 96; Owen (L A), 01  
**Glacial boulders, Osage River:** Buckley, 03b  
**Glacial drift under St. Louis loess:** Drushel, 08  
**Glacial geology, St. Louis and vicinity:** Drushel, 11  
**Granite and porphyry region:** Lonsdale, 94a  
**Jackson Co.:** McCourt, 17  
**Leavenworth quadrangle:** Hinds, 17  
**Lexington sheet:** Marbut, 98  
**Loess and drift:** Holmes (N), 68  
**Lowlands, southeastern Mo., evolution:** Marbut, 02  
**Macon Co.:** McGee, 88b  
**Miller Co.:** Ball (S H), 03  
**Moniteau Co.:** Van Horn, 05  
**Osage River:** Davis (W M), 93a; Winslow, 93c



## Missouri--Continued.

*Physiographic geology*—Continued.

- Ozark dome: Keyes, 98j
- Ozark Mountains: Keyes, 95g
- Ozark Plateau, valleys: Hershey, 95b
- Ozark region: Adams (G I), 01; Crane (G W), 12; Davis (W M), 93a; Park, 04; Lonsdale, 94a; Marbut, 04a
- Peneplains, Ozark highland: Hershey, 01
- St. Louis: Fenneman, 08
- Pleistocene: Todd, 94a
- Quaternary: Broadhead, 71; Swallow, 58a; Todd, 96a; southwestern Mo.: Broadhead, 79c
- Richmond quadrangle: Marbut, 98
- St. Francois and Washington Cos.: Buckley, 09
- St. Louis area: Fenneman, 09
- Smithville quadrangle: Hinds, 17
- Southeastern Mo.: Keyes, 96c; Marbut, 02, 02a; Shaw (E W), 15d
- Stream piracy, southeastern Mo.: Dake, 14

*Underground water.*

- Artesian water: McCoy, 13
- Camden Co., Decaturville dome: Shepard, 05
- General: Shepard, 04, 05a, 07
- Graydon sandstone waters: Babcock, 04
- Joplin district: Smith (W S T), 05b
- Mineral water, Henry, St. Clair, Johnson, and Benton cos.: Woodward (A E), 90a
- Mineral waters, Saline Co.: Woodward (A E), 90
- Ozark region: Fuller, 05p
- Springfield district: Park, 05

## Missouri and Yellowstone rivers head waters region: Hayden, 61

- Missouri Coteau: Todd, 85
- Missouri leviathan: Koch (A C), 43
- Missouri River: Broadhead, 89a; age: Upham, 04c; Pleistocene history: Todd, 14

## Missourian series: Keyes, 99a

## Missourium: Hoy, 71

## Missourium kochii: Goddard, 41

## Missourium theristocaulodon: Koch (A C), 45

## Mistassini expedition: Low, 85a

## Mitchell folio, S. Dak. (no. 99): Todd, 03b

## Mixodectidae: Osborn, 02b

## Mohave Desert: MacDougal, 16

## Mohave Desert region, Cenozoic history Baker (C L), 11

## Mohave district, Cal.: Bateson, 06

## Mohokea caldera: Hitchcock (C H), 06c

## Moldavites: Wright (F E), 15

Molding sand. *See also* Sand.

## Foundry molding sands: Cole, 17

## New York, Albany molding sand: Newland, 16b

## Virginia, Richmond district: Darton, 11

## Wisconsin: Ries, 06d

Mollusca. *See also* Cephalopoda; Gastropoda; Invertebrata; Pelecypoda.

## Alabama, Claiborne: Lea, 33

## Cretaceous: Tuomey, 54

## Eocene: Cossmann, 93; Gregorio, 90; Heilprin, 81; Meyer (O), 87; Whitfield, 65

## Midway formation: Aldrich, 94a

## Tertiary: Aldrich, 03

## Wood's Bluff: Aldrich, 03b

## Mollusca—Continued.

## Alaska, Neozoic: Dall, 04

## Alberta, Saskatchewan country, Cretaceous: Whiteaves, 87b

## Air-breathing: Dawson (J W), 95a

## Anthracopupa, Coal Measures, Ohio: Whitfield, 81c

## Antigua, Tertiary: Brown (A P), 14

## Arca, revision: Heilprin, 82

## Arisaig series, Nova Scotia: McLearn, 18a

## Arkansas, Tertiary: Harris, 94

## Astarte, Eocene, Mississippi: Aldrich, 10

## Bahama Islands: Dall, 05

## Barbados: Forbes, 48; Schomburgk, 48

## Bermuda: Gulick, 04

## Bibliography of post-Eocene marine of north-west coast of America: Dall, 09c

## British Columbia, Mesozoic: Whiteaves, 87a

## Mount Stephen: Matthew (G F), 02b

## Vancouver Island, Cretaceous: Meek, 61c

## Buda limestone fauna, Texas: Whitney (F L), 11

## California: Cooper (J G), 94

## Cretaceous: Cooper (J G), 97

## Eocene horizons: Waring (C A), 14; Marysville Buttes: Dickerson, 13

## Los Angeles, tunnel clays: Stearns, 00a

## Mariposa Co.: Gabb, 64c

## Martinez fauna: Weaver, 05

## Pliocene, Jacalitos Creek: Nomland, 16b

## Pliocene fresh-water Mollusca: Cooper (J G), 94a

## Pleistocene: Carpenter (P P), 66; Oldroyd, 14

## San Jose region, Cretaceous and Tertiary: Hall (E B), 16

## San Juan district: Anderson (F M), 14

## San Lorenzo series: Clark (B L), 18b

## San Pedro: Arnold, 03

## Santa Cruz Mountains, Cretaceous and Tertiary: Arnold, 08d

## Santa Margarita beds: Nomland, 17b

## Santa Monica Range: Rivers, 04

## southern, Tertiary: Arnold, 07, 07b, e, f

## Temblor Basin: Anderson (F M), 14

## Tertiary: Conrad, 55, 56, 56a, 57; Dall, 74, 79a, b

## Canada, post-Pliocene: Bell (R), 61

## Caney shale fauna, Okla.: Girty, 09b

## Carboniferous: McChesney, 59; Stevens (R P), 58; Kansas and Oklahoma: Beede, 16

## Caribbean region, Miocene: Gabb, 73a

## Cerithium, phylogeny: Wood (Elvira), 11

## Choctawhatchee marl, Fla.: Mansfield (W C), 16

## Claiborne fauna: Harris, 95

## Color, preservation in shells: Keyes, 90f

## Colorado, Cretaceous: Conrad, 74

## Florissant: Cockerell, 06g

## Colorado Desert: Stearns, 79

## Colorado fauna: Stanton, 93

## Comanche: Cragin, 97b

## Comanchean, Texas, Kansas, and Oklahoma: Cragin, 94b

## Conorbis, Florida: Heilprin, 85e

## Conrad's papers, date: Dall, 93

## Conrad's writings: Harris, 93d

## Conularia: Calvin, 90

## Conus: Green, 30



## Mollusca—Continued.

- Cretaceous: Conrad, 53c, 54, 55b, 69f; Gabb, 61d, e, 77; Marcou, 55c; Morton, 41a, 42  
 British Columbia, Vancouver Island: Meek, 64e  
 catalog: Gabb, 61; Meek, 64c  
 Colorado: Henderson (J), 08b  
 lower, British Columbia: Whiteaves, 83  
 Mexico, Coahuila: Böse, 13  
 New Jersey and Delaware: Morton, 29c  
 South Dakota: Evans (J), 57  
 Texas: Roemer, 52; Shumard (B F), 60a  
 Descriptions: Conrad, 46, 52a, 64; Hall, 45a; Owen (D D), 52a  
 Devonian, Montana: Raymond (P E), 09  
 Ohio: Whitfield, 82b  
 Wisconsin: Cleland, 11  
 Dismal Swamp: Woolman, 98  
 Eocene: Aldrich, 97; Conrad, 65f, h; Heilprin, 80; Johnson (C W), 99  
 Alabama: Aldrich, 07a; Meyer (O), 86; and Mississippi: Aldrich, 08a  
 Atlantic slope: Clark (W B), 96a  
 Gulf States: Aldrich, 11; Harris, 96a  
 marine: White (C A), 85a  
 Maryland and Virginia: Harris, 94a  
 Oregon: Conrad, 65g  
 Southern States: Aldrich, 10a  
 Eocene and Oligocene, catalog: Conrad, 65d, 66  
 Evolution in fossil shells: Hyatt, 89a  
 Fernando fauna, Los Angeles, Cal.: Moody, 16  
 Florida, Anastasia Island: Say, 24  
 Eocene, Tampa Bay: Conrad, 46e  
 Tampa, Oligocene: Dall, 15  
 Tertiary: Aldrich, 03; Dall, 90; Heilprin, 87a  
 Volusia Co.: Mansfield (W C), 18  
 Fresh and brackish water, catalog: White (C A), 77c  
 Fresh-water and land types, antiquity: White (C A), 80f  
 Fresh-water mollusks, geologic descent: White (C A), 82d  
 Fulgur: Conrad, 53  
 Genera and species, new: Conrad, 66c, e, f, 68, 69a  
 General: Conrad, 53a, b, 60a, 65c, 66d, 67b, c, 69a, d, 70, 71b, c, 72, 77c; Dall, 98b; Gabb, 66; Heilprin, 81c; Marcou, 58; Rafinesque, 64; Say, 19  
 Georgia, Flint River, Oligocene: Dall, 16; Eocene: Conrad, 50  
 Greenland, Jurassic and Cretaceous: Ravn, 11a  
 Gryphaea pitcheri, original locality: Marcou, 89d  
 Guadalupian fauna: Girty, 08  
 Haiti, Oligocene: Pilsbry, 10; Tertiary: Guppy, 76  
 Haploscapa, Niobrara beds: Conrad, 75  
 Helicina: Shimek, 05  
 Helicina occulta, distribution: Keyes, 89i  
 Idaho, Truckee group: White (C A), 83i  
 Illinois, Carboniferous: Worthen, 83b  
 Pleistocene: Baker (F C), 15  
 postglacial: Baker (F C), 18  
 Index fossils: Grabau, 09f  
 Indiana, old forest bed: Billups, 02; Posey Co., Quaternary: Daniels, 05  
 Iowa, Devonian: Keyes, 88e; loess: Keyes, 88; Shimek, 01

## Mollusca—Continued.

- Jamaica, Tertiary: Guppy, 66, 73; Moore (J C), 63  
 John Day: Stearns, 02; White (C A), 85a  
 John Day and Mascall beds: Stearns, 06  
 Judith River formation, freshwater shells: White (C A), 77a  
 Jurassic: Davis (C H), 13  
 boreal types in Mexico: Burekhardt, 12a  
 Greenland: Lundgren, 96  
 Mexico: Castillo, 95  
 Western States: Hyatt, 94a  
 Kansas, Cretaceous: Cragin, 94; Permian: Meek, 64f  
 Kentucky, Coal Measures: Cox (E T), 57; Silurian and Devonian: Nettleroth, 89  
 Land shells: Cooper (J G), 86; Pacific slope: Cooper (J G), 87  
 Land snails, Paleozoic: Dawson (J W), 80f  
 Laramie beds: White (C A), 83h, m, 86; distribution: White (C A), 78a  
 Lignitic stage: Harris, 99  
 Loess fossils, Iowa: Shimek, 88  
 Louisiana, Cretaceous and Eocene: Harris, 99c; Tertiary: Vaughan, 96  
 Lymnaea: Baker (F C), 09  
 Maclurite (Maclurea): Le Sueur, 18  
 Maine, shells in Mud Lake: Nylander, 09; Silurian, Washington Co.: Williams (H S), 13a, 12  
 Manitoba, Devonian: Whiteaves, 91a  
 Martinez fauna, Eocene: Dickerson, 14a, d  
 Maryland: Say, 24a  
 Calvert Cliffs: Conrad, 41b, 42  
 Lower Cretaceous: Clark (W B), 11a; Lull, 11  
 Pliocene: Wagner, 39  
 Tertiary: Conrad, 30, 30a; Lea, 33; Newton, 02  
 Massachusetts, Easthampton: Hitchcock (E jr), 56; Marthas Vineyard, Cretaceous: Shaler, 89d  
 Melanellid mollusks, Pacific region: Bartsch, 17  
 Mexico, Chihuahua: Gabb, 72b  
 Lower California: Böse, 07; Pleistocene: Dall, 18a  
 Miocene, Zuluzum: Engerrand, 10  
 Tehauntepec, Pliocene: Toula, 11; Tertiary, Böse, 10c  
 Midway stage: Harris, 96  
 Miocene: Conrad, 66b, 67e, 68, 68a, 69b; Olsson, 14a  
 catalog: Conrad, 62a; Meek, 64d  
 Central America: Gabb, 81  
 fresh-water: White (C A), 85a  
 Mississippi: Wailes, 54  
 Cretaceous: Tuomey, 54  
 Eocene: Conrad, 55a, 65e; Meyer (O), 87; Whitfield, 65  
 Newton and Wautubbee: Meyer (O), 86c  
 Tertiary: Aldrich, 03  
 Tippah Co., Cretaceous: Conrad, 58  
 Vicksburg: Casey, 03; Meyer (O), 86b  
 Missouri: Keyes, 94d  
 Callaway Co., Pleistocene: Greger, 16  
 Carboniferous and Devonian: Swallow, 60  
 post-Pliocene: Sampson, 14



## Mollusca—Continued.

- Missouri River region: Meek, 60b, 61d  
 Mitra, Florida: Aldrich, 10  
 Montana, Cretaceous: Meek, 62; fresh-water:  
   Stanton, 03; Tertiary: Meek, 56c  
 Nassidae, Tertiary: Herold, 17  
 Neocene, Atlantic Coastal Plain: Olson, 14;  
   California: Martin (B), 14  
 New Brunswick, post-Pliocene: Matthew (G F),  
   74  
 New Jersey, Cretaceous: Forbes, 45; Gabb, 60c;  
   Lea, 61  
   Eocene: Conrad, 65i  
   Miocene: Heilprin, 88b; Whitfield, 94  
   Mount Laurel, Cretaceous: Johnson (C W), 98  
   Pleistocene: Baker (F C), 03  
   Warren Co.: Leidy, 45  
 New Mexico, Mount Taylor region: Shimer, 08a  
   San Juan Co., nonmarine Cretaceous: Stan-  
   ton, 16  
 New York: Hall, 88  
   Bronx Borough, fresh-water fossils: Hum-  
   phreys, 09  
   Devonian: Hall, 79  
 Nomenclature rectifications: Henderson (J), 18  
 Nonmarine: White (C A), 83k  
 North Carolina, Cretaceous: Conrad, 75a  
   Duplin Co.: Conrad, 40c  
   Miocene: Conrad, 72a; Olsson, 16  
   Pliocene: Wagner, 39  
   Wilmington: Brown (A P), 12a  
 North Dakota, Tertiary: Meek, 56c; Peno  
   Creek: Evans (J), 54b  
 Northwest America: Dall, 12  
 Nova Scotia, Carboniferous: Dawson (J W),  
   60a, 63; Lyell, 53b; Salter, 63  
 Ohio, Maxwell limestone fauna: Morse, 11  
 Oligocene, Washington: Dickerson, 17a  
 Oregon, Astoria: Conrad, 48, 49a  
   John Day region: Stearns, 00, 06  
   Roseburg quadrangle: Dickerson, 14  
 Origin and geographic distribution: Bland, 52  
 Ostrea, Delaware: Morton, 29a  
 Paleozoic: Meek, 65j, 71d  
 Palmula, Timber Creek: Lea, 33  
 Panama, Gatun fauna: Brown (A P), 11a;  
   Toula, 09; Pleistocene: Brown (A P), 13  
 Panama and Costa Rica: Dall, 12a  
 Pennsylvania, Carboniferous: Lea, 53a  
 Permian, Texas: Leuchs, 08  
 Pleistocene, Kansas: Hanna, 13  
   Maryland: Clark (W B), 06b  
   South Carolina: Pugh, 05  
 Pleurodonte debooyi, St. Croix, West Indies:  
   Bartsch, 18  
 Pliocene, Coastal Plain: Dall, 13; Tuxtepec,  
   Mex.: Böse, 05a  
 Polorthus: Gabb, 72a  
 Post-Pliocene, Niagara gravels: Letson, 01  
 Psammobiidae, Tertiary: Dall, 98a  
 Pyrgulopsis scalariformis: Shimek, 92  
 Quaternary, Great Basin: Call, 85  
   Greenland: Jensen, 09  
   list: Dall, 85  
   Maine: Mighels, 42  
   Ohio, Defiance Co.: Sterki, 07  
 Quebec: Lyell, 41

## Mollusca—Continued.

- Ripley fauna, Tennessee: Wade, 17  
 San Domingo, Tertiary: Moore (J C), 53;  
   Sowerby, 50  
 Santo Domingo: Gabb, 73; Maury, 17; Oligo-  
   cene: Pilsbry, 17; Pleistocene: Vanatta,  
   14  
 Say's types of Maryland Mollusca: Newton, 02  
 Scaphites and Crepidula: Morton, 29d  
 Scaphopoda, Jamaican Oligocene and Costa  
   Rican Pliocene: Pilsbry, 11  
 Senonian, Mexico: Böse, 06a  
 Silurian, Canada: Billings, 74b; Maine, Wash-  
   ington Co.: Williams (H S), 12  
 Solenopsidae: Cockerell, 15f  
 South Carolina, Scutella: Ravenel, 41  
 South Dakota, Black Hills region: Meek, 58b;  
   interglacial: Baker (F C), 13b  
 Succinidae of loess, variation: Shimek, 94  
 Tertiary: Aldrich, 85b, 87; Conrad, 32, 35b, 38,  
   43, 44, 54, 54a, 55b, 62, 62b; Gabb, 61f;  
   Joukowsky, 06; Meyer (O), 84, 85; Toula,  
   11a  
   Alabama and Mississippi: Aldrich, 86  
   Alabama and Texas: Aldrich, 95  
   Atlantic Coastal Plain: Conrad, 42b  
   California: Anderson (F M), 14; Hannibal,  
     12; Santa Barbara Co.: Arnold, 08  
   Carolinas: Conrad, 41a  
   catalog: Lea (H C), 48; Morton, 34  
   Greenland: Ravn, 03  
   Long Island: Gratacap, 14  
   Mexico: Böse, 06  
   New Mexico: Cockerell, 14  
   North Carolina: Tuomey, 52  
   Rocky Mountain region: Cockerell, 12a, 15h  
   southeastern States: Conrad, 33  
   southern States: Conrad, 34a; Dall, 96a  
   Washington: Weaver, 16a  
   West Indies: Guppy, 74, 96  
   western States: White (C A), 83a  
   Wyoming and Utah: White (C A), 77b  
 Texas, Buda limestone: Shattuck, 03  
   Cretaceous: Conrad, 55c; Hill, 89c; Chamidae:  
     White (C A), 84a  
   Eocene: Heilprin, 91  
   Galveston well, Neocene: Harris, 95a  
   Tertiary: Conrad, 55c; Harris, 95b  
 Tobago: Guppy, 04d  
 Trianisites: Rafinesque, 39  
 Triassic, Alaska: Martin (G C), 16; Mexico,  
   Zacatecas: Burckhardt, 05  
 Trinidad: Guppy, 08; Maury, 12; Springvale,  
   Miocene: Guppy, 10, 11a  
 Unionidae: White (C A), 77d  
 Vicksburg: Conrad, 47, 49  
 Virginia, Eocene: Tuomey, 42  
   Miocene: Olsson, 16  
   Tertiary: Lea (H C), 43, 46; Rogers (H D),  
     37  
 Washington: Reagan, 07; Weaver, 12a  
   Oligocene: Van Winkle, 18  
   Olympic Peninsula: Reagan, 09  
 West Indies: Guppy, 79; Lorié, 89  
   Miocene: Guppy, 67b  
   terrestrial: Bland, 71  
 Wyoming, Eocene: White (C A), 83h  
   Sage Creek: Evans (J), 54a



Molluscoidea. *See* Brachiopoda; Bryozoa.

Molybdenum.

- Arizona, Hualpai Mountains: Wickes, 17;  
Santa Rita and Patagonia Mountains:  
Schrader, 10a  
British Columbia: Evans (H F), 05d; Walker  
(T L), 11, 11a  
Lillooet mining division: Drysdale, 17a  
Lost Creek: Drysdale, 15c  
Tulameen district: Camsell, 13  
California: Boalich, 18; Hess, 08b  
Canada: Johnston (R A A), 04; Malcolm, 18;  
Smith (W H), 15; Walker (T L), 11, 11a;  
Willimott, 04  
Colorado, Climax: Brown (H L), 18  
Monarch and Tomichi districts: Crawford, 13  
Distribution, United States: Hillebrand, 98  
General: Baskerville, 08; Fleck, 16; Hillebrand,  
00; Horton, 16; Wells, 03; Wolf, 18  
Maine: Emmons (W H), 10a; Hess, 08b; Tunk  
Pond: Hills (B W), 09  
Manitoba, Falcon Lake area: Bruce, 18b; De  
Lury, 17  
New Brunswick: Walker (T D), 11, 11a, b  
Occurrence: Ball (S H), 17, 18  
Ontario: Parsons (A L), 17; Walker (T L), 11,  
11a  
Dryden gold area, district of Kenora: Thom-  
son (Ellis), 17  
Oregon: Stafford, 04  
Quebec: Walker (T L), 11, 11a; Wilson (W J),  
06a  
Haliburton and Bancroft areas: Adams (F D),  
10d  
northwestern: Bancroft (J A), 12a  
Pontiac Co.: Thomson (Ellis), 18  
Quyon district: Camsell, 17a; Wilson (M E),  
18b  
Timiskaming Co.: Wilson (M E), 18  
Turn Back Lake: Swieczey, 13  
United States: U S G S, 83

Monazite.

- General: Derby, 00; Kithil, 15; Nitze, 95a, b,  
97a; Pratt, 02e; Sterrett, 07c  
Idaho: Lindgren, 97b; northern: Schrader, 10  
North Carolina: Böhm, 06; Nitze, 95; Pratt,  
08, 09, 09a, 13, 16  
Origin: Derby, 00  
South, Carolina: Böhm, 06; Pratt, 08, 09a;  
Sloan, 07, 08; Sterrett, 07a  
United States: Pratt, 17  
Virginia: Watson, 07e  
Monadnocks, arid: Keyes, 08c  
Monarch district, Colo.: Crawford (R D), 10  
Moncton map area, Westmorland and Albert cos.,  
N. B.: Young, 12  
Monhegan Island, Me.: Lord, 00a  
Monks Mound: Crook, 18  
Mono Valley, Cal.: Russell, 89  
Monoclinial ridges: Powell, 80a  
Monoclonius, Alberta: Brown (B), 14b  
Monongahela basin, denudation and erosion: Glenn,  
11  
Monroe formation: Grabau, 10

Montana.

- Crazy Mountains: Wolff, 08b  
Fossil forest, Gallatin Mountains: Knowlton,  
14c

Montana—Continued.

- General: Emmons (S F), 85, 93; Newberry,  
81a; Peale, 73; Rath, 84  
Geological reconnaissance: Douglass, 09a  
Nampa image: Wright (G F), 91a  
Northern Mont.: Finlay (G I), 03c  
Northern Pacific Railroad, country bordering:  
Newberry, 85d  
Sweet Grass Hills: Ledoux, 91  
*Economic geology.*  
Anticlines, Blackfeet Indian Reservation:  
Stebinger, 17a  
Barytes deposits: Rowe, 08b  
Bearpaw Mountains, mineral deposits: Pepper-  
berg, 10  
Big Sandy coal field, Chouteau Co.: Bowen  
(C F), 14b  
Bitterroot Range: Lindgren, 03b, 04b  
Blue Bird mine, Wickes; Winchell (H V), 12b  
Boulder batholith: Billingsley, 15, 17; Knopf,  
14c  
Boulder district: Freeman (H C), 95a  
Boulder Hot Springs: Weed, 00a  
Bozeman coal field: Weed, 91  
Building stone: Rowe, 08  
Bull Mountain coal field, Musselshell and Yel-  
lowstone cos.: Woolsey, 17  
Butte district: Bacorn, 14; Braden, 02; Brown,  
(R G), 95; Emmons (S F), 87a, 97; Gra-  
ton, 13a; Miller (G W), 04; Sales, 08, 13;  
Weed, 03b, 12  
Gagnon vein: Pearce, 87c  
paragenesis of ore minerals: Ray, 14  
physiographic conditions at time of ore en-  
richment: Atwood, 16  
Rainbow lode: Blake (W P), 87  
replacement: Ray, 15a  
sulphide enrichment and chalcocite forma-  
tion: Rogers (A F), 13c  
Butte geological report: Sales, 12  
Butte mines, applied geology in: Linforth, 13  
Butte veins, superficial alteration: Sales, 10  
Carter district: Rowe, 11b  
Castle Mountain district: Weed, 96a  
Cement resources: Eckel, 13; Weed, 05a; near  
Havre: Pepperberg, 09  
Cinnabar coal field: Weed, 91  
Clay: Rowe, 08  
Kootenai clays near Belt: Fisher, 08b  
northeastern Mont.: Bauer, 14  
Clearwater Mountains: Lindgren, 03b  
Cleveland coal field, Blaine Co.: Bowen (C F),  
14a  
Clinton district, Missoula Co.: Rowe, 10e  
Coal: Davis (W M), 86b; Eldridge, 86; Leonard  
06a; Parsons (F W), 07b; Ritter, 061  
Rowe, 03a, 05a, 06, 07, 07a, 08, 08a, c,  
Stebinger, 13a; Weed, 91d, 92b, 95  
Baker field, Custer Co.: Bowen (C F), 12  
Bear Creek fields: Fisher (C A), 06c  
Big Sandy field: Bowen (C F), 14b  
Bozeman and Cinnabar fields: Weed, 91  
Bridger field: Washburne, 09  
Bull Mountain field: Lupton, 11; Richar-  
(R W), 09; Rowe, 15a; Woolsey, 09, 17  
Carbon Co. coals: Darton, 07a  
Cleveland field: Bowen (C F), 14a



## Montana—Continued.

*Economic geology*—Continued.

Coal: Culbertson field: Beekly, 12  
 Crazy Mountains: Stone (R W), 09  
 Custer National Forest: Wegemann, 09a  
 Dawson, Rosebud, and Custer cos.: Leonard, 07  
 eastern Mont.: Palmer (L A), 14b  
 Electric field, Park Co.: Calvert, 12b  
 Flathead basin: Wood (H R), 92c  
 Fort Peck Indian Reservation lignite field: Smith (C D), 09b  
 Glendive lignite field, Dawson Co.: Hance, 12  
 Great Falls field: Barnett, 16; Fisher (C A), 07, 09; Newberry, 87; Shurick, 09; Weed, 92  
 Lewistown field: Calvert, 09, 09a  
 Little Sheep Mountain field: Rogers (G S), 13  
 Livingston and Trail Creek fields: Calvert, 12a  
 Miles City field: Collier, 09a  
 Milk River field: Pepperberg, 09a, 12  
 Musselshell-Judith area: Bowen (C F), 14  
 Pine Ridge field: Rogers (G S), 14  
 Red Lodge field: Woodruff, 09  
 Rocky Fork field: Rowe, 10; Weed, 92  
 Roundup mines: Rowe, 09a  
 Sentinel Butte lignite field: Leonard, 09  
 Sidney field, Dawson Co.: Stebinger, 12  
 southwestern Mont.: Pardee, 13a  
 Stillwater basin: Calvert, 16  
 Terry field, Custer Co.: Herald, 12  
 Tertiary lake beds, southwestern Mont.: Pardee, 13a  
 Teton Co.: Stebinger, 16  
 western Mont.: Palmer (L A), 14a  
 Cooke City district, Park Co.: Gardner (E D), 14  
 Copper: Weed, 06  
 Bearpaw Mountains: Pepperberg, 10  
 Belt formation: Collen, 07  
 Blue Bird mine: Winchell (H V), 12b  
 Butte district: Emmons (S F), 97; Kirk (C T), 12; Peters, 85, 85a; Rath, 85b; Ray, 14; Rogers (A F), 13c; Sales, 13; Simpson (J F), 08; Thompson (A P), 15; Weed 12, 13; Winchell (H V), 03, 04; genesis: Lawson, 14a  
 East Cœur d' Alene district: Moore (H A), 10  
 Elkhorn Mountains: Stone (R W), 11  
 Helena region: Knopf, 13  
 Missoula Co., Clinton district: Rowe, 10e  
 Philipsburg quadrangle: Emmons (W H), 07a  
 Corundum: Smith (J L), 73a; Gallatin Co.: Edman, 02; Ropes, 01  
 Covellite, Butte: Thompson (A P), 15  
 Culbertson lignite field, Valley Co.: Beekly, 12  
 Dillon quadrangle: Winchell (A N), 14  
 Dunkleberg mining district, Granite Co.: Pardee, 17a  
 Eastern Mont.: Rowe, 16  
 Elkhorn ore deposits: Knopf, 12c, 13b; Stone (R W), 11; Weed, 01  
 Empire lode, Marysville: Beadle, 93  
 Fergus Co.: Freeman (O W), 17; Ammon mines: Freeman (H C), 95  
 Flint Creek district: Goodale, 90  
 Fort Benton quadrangle: Weed, 99  
 Garnet district, Granite Co.: Rowe, 10d

## Montana—Continued.

*Economic geology*—Continued.

Garnet Range: Pardee, 18  
 General: Kleinschmidt, 69; Rowe, 08; Wood (H R), 92d  
 Georgetown district: Brown (R G), 94; Southern Cross mine: Billingsley, 13  
 Gold deposits: Lincoln, 11c; MacDonald (D F), 06; Mead (J R), 90; Rowe, 10b  
 Alder Gulch: Douglass, 05b  
 Bear Gulch: Pearce, 98h  
 Bearpaw Mountains: Pepperberg, 10  
 Butte district: Rath, 85b; Weed, 12  
 East Cœur d'Alene district: Moore (H A), 10  
 Elkhorn Mountains: Stone (R W), 11  
 Garnet district, Granite Co.: Rowe, 10d  
 Garnet Range: Pardee, 18  
 Georgetown district: Billingsley, 13  
 Helena, region: Knopf, 13  
 Judith Mountains: Courtis, 84; Weed, 98  
 Little Rocky Mountains: Boynton, 06; Emmons (W H), 08b  
 Marysville district: Weed, 03  
 North Moccasin Mountains: Freeman (O W), 15  
 northwestern Mont.: Schrader, 11  
 Philipsburg quadrangle: Emmons (W H), 13b  
 Radersburg district: Bard, 10a  
 Ruby, gold dredging: Hutchins, 07  
 western Mont.: Rowe, 10b, 11d  
 Windfall Creek placer : Moore (H A), 10a  
 Gold nugget, Bear Gulch: Pearce, 02a  
 Gold-bearing ground moraine: Schrader, 11  
 Golden Leaf mines, Beaverhead Co.: Barrell, 97  
 Granite: Rowe, 08  
 Graphite deposit : Rowe, 08, 08d; Dillon: Bastin, 12; Winchell (A N), 11a, b  
 Gypsum: Rowe, 05, 07b, 08, 08f; Weed, 04; central Mont.: Freeman (O W), 16  
 Helena district: Sisley, 97; Drumlummon veins: Clayton, 88a  
 Helena region: Knopf, 13; silver-lead deposits: Knopf, 13a  
 Iceland spar: Parsons (A L), 18  
 Iron, Blackfeet Reservation: Stebinger, 14a  
 Elkhorn deposits: Knopf, 13b  
 Iron Mountain district, Missoula Co.: Rowe, 10c  
 Judith Mountains: Hoyt, 14; Weed, 96g, 98  
 Lake Basin field, oil and gas possibilities: Hancock, 18  
 Lead: MacDonald (D F), 06  
 Bearpaw Mountains: Pepperberg, 10  
 Dunkleberg district: Pardee, 17a  
 East Cœur d'Alene district: Moore (H A), 10  
 Elkhorn Mountains: Knopf, 13b; Stone, 11  
 Helena region: Knopf, 13, 13a  
 Missoula Co., Iron Mountain district: Rowe, 10c  
 Lead and iron, native: Genth, 70  
 Libby district, Cabinet Range: Wood (H R), 92e  
 Lignite deposits: Leonard, 06a; Rowe, 06, 07, 08, 08c; Mitchell, 10b (*see also* Coal above)  
 eastern Mont.: Rowe, 15  
 Sheridan Co.: Bauer, 14a  
 Limestone: Mitchell, 10b; Rowe, 08; central Mont.: Freeman (O W), 16



## Montana—Continued.

*Economic geology—Continued.*

- Little Belt Mountains: Weed, 00  
 Little Belt Mountains quadrangle: Weed, 99a  
 Little Rockies mining district: Boynton, 06  
 Little Rocky Mountains: Weed, 96f  
 Livingston quadrangle: Iddings, 94  
 Manganese: Harder, 10  
   Butte: Pardee, 18b  
   Madison Co.: Pardee, 18c  
   Philipsburg: Umpleby, 17c  
 Marysville district: Goodale, 14; Ropes, 16, 16a  
 Missoula Co., mines: Rowe, 11c; Iron Mountain mine: Beadle, 95  
 Neilhart district: Weed, 96h  
 Niter near Melrose: Richards (R W), 13a, 14  
 North Moccasin Mountains: Freeman (O W), 15  
 Northwestern Mont.: MacDonald (D F), 06, 09a  
**Oil** and gas possibilities, Birch Creek-Sun River area, northwestern Mont.: Stebinger, 18; north central Mont.: Stebinger, 16a  
 Oil and gas probabilities: Rowe, 15  
 Oil shales, Beaverhead Co.: Bowen (C F), 18a  
 Park Co.: Gardner (E D), 14  
 Petroleum: Willis, 01a  
 Philipsburg, Granite-Bimetallic mine: Emmons (W H), 08c  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Phosphate, Elliston field: Stone, 14  
   Garrison-Philipsburg fields: Pardee, 17  
   Melrose: Gale, 11  
   western Mont.: Pardee, 13  
 Placers in western Mont.: Rowe, 10b, 11d  
 Pyrite: Zimanyi, 00  
 Radersburg mining district: Bard, 10a  
 Saltse: Calkins, 14  
 Sapphires, Fergus Co.: Dwight (A S), 95; Freeman (O W), 15a; Kunz, 97; Pirsson, 97, 00; Rowe, 09  
 Silver, Bearpaw Mountains: Pepperberg, 10  
   Blue Bird mine: Winchell (H V), 12b  
   Butte district: Emmons (S F), 97; Peters, 85b; Weed, 12  
   East Cœur d'Alene district: Moore (H A), 10  
   Elkhorn Mountains: Knopf, 13b; Stone (R W), 11  
   Granite-Bimetallic mine: Emmons (W H), 08c  
   Helena region: Knopf, 13, 13a  
   Little Belt Mountains quadrangle: Weed, 99a  
   Missoula Co., Iron Mountain district: Rowe, 10c  
   Northwestern Mont.: MacDonald (D F), 09a  
   Philipsburg quadrangle: Emmons (W H), 07a, 13b  
 Southern Cross mine, Georgetown: Billingsley, 13  
 Stillwater basin, Stillwater and Carbon cos.: Calvert, 16  
 Sulphur: Russell, 82  
 Tellurium: Pearce, 97  
 Teton Co.: Stebinger, 16  
 Three Forks quadrangle: Peale, 96  
 Tungsten minerals: Winchell (A N), 10a

## Montana—Continued.

*Economic geology—Continued.*

- Vein formation, Boulder Hot Springs: Weed, 00c  
 Volcanic ash beds: Rowe, 03  
 Windfall Creek placers: Moore (H A), 10a  
 Zinc: MacDonald (D F), 06  
   Butte district: Weed, 12  
   Dunkleberg district: Pardee, 17a  
   Missoula Co., Iron Mountain district: Rowe, 10c  
*Historical geology.*  
 Algonkian formations: Walcott, 06  
 Baker lignite field, Custer Co.: Bowen (C F), 12  
 Bearpaw Mountains: Weed, 96c  
 Belt formation, Helena: Rothpletz, 15  
 Big Blackfoot Valley: Winchell (N H), 04e  
 Big Horn Mountains: Darton, 06e  
 Big Sandy coal field, Chouteau Co.: Bowen (C F), 14b  
 Birch Creek-Sun River area, northwestern Mont.: Stebinger, 18  
 Bitterroot Range: Lindgren, 04b, 05j  
 Blackfeet Indian Reservation: Stebinger, 17a  
 Borings: Huntley, 15a  
 Boulder batholith: Billingsley, 15, 17  
 Bowdoin dome: Collier, 17  
 Bozeman coal field: Weed, 91  
 Bull Mountain coal field, Musselshell and Yellowstone cos.: Lupton, 11; Woolsey 17  
 Butte district: Braden, 02; Emmons (S F) 87a; Meinzer, 14b; Weed, 97, 12  
 Cabinet Range: Wood (H R), 93  
 Cambrian: Burling, 14; Walcott, 08a, 17; Helena Walcott, 14  
 Castle Mountain district: Weed, 96a  
 Ceratops beds: Stanton, 09  
 Cleveland coal field, Blaine Co.: Bowen (C F), 14a  
 Cinnabar coal field: Weed, 91  
 Coal fields: Stebinger, 13a  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Crazy Mountains: Wolff, 85, 92  
 Cretaceous: Knowlton, 98e; Sternberg, 15; northwestern Mont.: Wood (H R), 92  
 Cretaceous and Tertiary formations: Leonard 11  
 Cretaceous formations, correlation: Hares, 17a  
 Cretaceous seacoast: Thom, 17  
 Deep River region: Scott, 91a  
 Devonian: Peale, 85a; upper: Haynes, 16  
 Dillon quadrangle: Winchell (A N), 14  
 Dunkleberg mining district, Granite Co.: Pardee, 17a  
 Eastern Mont.: Rowe, 16  
 Electric coal field, Park Co.: Calvert, 12b  
 Elkhorn district, Jefferson Co.: Weed, 01  
 Fort Benton beds: Douglass, 03  
 Fort Benton quadrangle: Weed, 99  
 Fort Union formation: Weed, 96e  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg region: Pardee, 17  
 General: Davis (W M), 86b; Hayden, 57, 72, 73, 76b; Kleinschmidt, 69; Lindgren, 91a; Meek, 73; Mortson, 92; Willis, 01a



## Montana—Continued.

*Historical geology*—Continued.

- Geologic map: Hayden, 72a  
 Glacier National Park: Campbell (M R), 14b  
 Glendive lignite field, Dawson Co.: Hance, 12  
 Gordon Mountain section: Walcott, 17  
 Great Falls region: Fisher (C A), 09, 09a; Weed, 92  
 Haystack stock: Emmons (W H), 08  
 Helena region: Griswold, 98; Knopf, 13; Rothpletz, 15; Walcott, 14  
 Hell Creek and Ceratops beds: Knowlton, 09  
 Hell Creek beds of upper Cretaceous: Brown (B), 07  
 Hellgate Valley: Winchell (N H), 04e  
 Highwood Mountains: Pirsson, 05; Weed, 95a  
 Hound Creek district, Cascade Co.: Barnett, 16  
 Iron Butte: Calvin, 89  
 Jefferson limestone: Kindle, 08b  
 Judith Mountains: Weed, 96g, 98  
 Judith River badlands: Hayden, 59a  
 Judith River beds: Hatcher, 03b; Stanton, 05  
 Judith River formation: Bowen (C F), 15; Cope, 77a; Peale, 12; Sternberg, 83  
 Judith River region: Meek, 57  
 Kootenai and Montana coal-bearing formations: Fisher, 08a  
 Lacustrine deposits: Peale, 86a  
 Lake Basin Field: Hancock, 18  
 Lance formation: Knowlton, 11a  
 Laramie formation: Weed, 93a  
 Lebo shale member of Fort Union formation: Rogers (G S), 13a  
 Lewis and Livingston ranges: Willis, 02  
 Lewistown coal field: Calvert, 09a  
 Libby district, Cabinet Range: Wood (H R), 92e  
 Lignite fields, eastern Mont.: Calvert, 12  
 Little Belt Mountains: Weed, 00  
 Little Belt Mountains quadrangle: Weed, 99a  
 Little Bitterroot Valley: Meinzer, 16  
 Little Rocky Mountains: Weed, 96b  
 Little Sheep Mountain coal field, Dawson, Custer, and Rosebud cos.; Rogers (G S), 13  
 Livingston and Trail Creek coal fields: Calvert, 12a  
 Livingston formation: Stone (R W), 10; Weed, 93a  
 Livingston quadrangle: Iddings, 94  
 Loess deposits: Shaler, 99b  
 Maiden Rock: Adams (F D), 15a  
 Marysville district: Barrell, 07  
 Milk River coal field, Chouteau Co.: Pepperberg, 12  
 Miocene lake basin, Camp Baker: Grinnell, 76  
 Montana group: Bowen (C F), 15; Stebinger, 14, 14b  
 Morrison formation: Mook, 16  
 Musselshell Valley: Bowen (C F), 18e  
 Musselshell-Judith area: Bowen (C F), 14  
 Neocene lake beds: Douglass, 99  
 North-central Mont.: Stebinger, 16a  
 Northeastern Mont.: Collier, 18a  
 Northern and central Mont.: Mortson, 76  
 North Moccasin Mountains: Freeman (O W), 15

## Montana—Continued.

*Historical geology*—Continued.

- Northwestern Mont.: Calkins, 09; Culver, 92; MacDonald (D F), 06  
 Ordovician rocks: Darton, 06b  
 Paleozoic, Three Forks: Peale, 93  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Pine Ridge coal field: Rogers (G S), 14  
 Pre-Cambrian, Helena: Walcott, 14  
 Rocky Mountain region, Paleozoic: Tomlinson, 17  
 Rosebud Co., Porcupine dome: Bowen (C F), 15a  
 Sheridan Co.: Bauer, 14a  
 Shonkin Sag and Palisade Butte laccoliths, Highwood Mountains: Weed, 01b  
 Sidney lignite field, Dawson Co.: Stebinger, 12  
 South central Mont.: Douglass, 02a  
 Southern Mont.: Dana (E S), 76  
 Southwestern Mont.: Condit, 18; Douglass, 05a  
 Stillwater basin, Stillwater and Carbon cos.: Calvert, 16  
 Sun River district: Powers, 14  
 Sweetgrass Co.: Douglass, 02a  
 Terry lignite field, Custer Co.: Herald, 12  
 Tertiary: Douglass, 03a, 05; Meek, 56d  
 Tertiary lake beds, southwestern Mont.: Pardee, 13a  
 Teton Co.: Stebinger, 16  
 Three Forks quadrangle: Peale, 96  
 Three Forks region: Haynes, 15, 16a  
 Two Medicine formation: Stebinger, 17

*Mineralogy*.

- Baddeleyite: Rogers (A F), 12a  
 Barite and selenite crystals: Rowe, 04  
 Butte district: Bard, 13; Pearce, 87; Weed, 12; paragenesis of ore minerals: Ray, 14  
 Cubanite, Butte: Winchell (H V), 98a  
 Descloizite: Hillebrand, 89a  
 Enargite, Missoula Co.: Moses, 95  
 Epiboulangerite, Superior district: Shannon (E V), 17c  
 Gagnon Mine, Butte: Hillebrand, 89  
 Goslarite, Butte: Pearce, 86a  
 Iceland spar: Parsons (C L), 18  
 Lazulite: Merrill (G P), 18e  
 Ludwigite: Schaller, 10a  
 Meteorite, Illinois Gulch, Deer Lodge Co.: Cohen, 92; Preston (H L), 00  
 Mullanite: Shannon, 18  
 Orthoclase twins of unusual habit: Ford, 08a  
 Parisite, Ravalli Co.: Penfield, 99a  
 Pearceite, Marysville: Penfield, 96a, b  
 Philipsburg quadrangle: Emmons (W H), 13b  
 Rhodocrosite, Butte: Pearce, 98f, 02  
 Sapphires, Fergus Co.: Pratt, 97a  
 Tellurium: Pearce, 98e  
 Vanadiferous ægirites from Libby: Larsen, 13a

*Paleontology*.

- Albertella fauna: Burling, 14; Walcott, 17  
 Algonkian algal flora: Walcott, 14  
 Alligator, Hell Creek beds: Gilmore, 11  
 Amphibia, Judith River and Fox Hills beds: Cope, 77e  
 Anomalofilicites, Dawson Co., Mont.: Hollick, 16



## Montana—Continued.

*Paleontology*—Continued.

- Astropecten?* *montanus*, Fort Benton beds: Douglass, 03  
 Belt formation, Helena: Rothpletz, 15  
*Blastoidea* and *Brachiopoda*, Carboniferous, southwestern Mont.: Clark (T H), 17  
*Blattoid*, Cretaceous: Handlirsch, 06a  
 Bozeman coal field flora: Knowlton, 92  
*Brachyceratops*, Two Medicine formation: Gilmore, 17  
*Cephalopoda*: Meek, 56a  
*Ceratopsian* dinosaur: Gilmore, 14a  
*Champsosaurus*, osteology: Brown (B), 05  
*Chisternon?* *interpositum*: Hay (O P), 09a  
*Clymenia* fauna, Devonian: Raymond (P E), 12  
*Coniornis*, Cretaceous: Marsh, 93  
 Cretaceous: Sternberg, 15  
   flora: Ward, 05  
   fresh-water Mollusca: Stanton, 03  
*Crinoidea*, Mississippian: Miller (S A), 96b, 97  
*Crocodile*, Judith River beds: Holland, 09  
*Cupressinoxylon*: Knowlton, 88a  
*Cypraea*, Cretaceous: Campbell (J H), 92  
 Deep River Mammalia: Scott, 91a, 93c  
 Devonian fauna: Raymond (P E), 07, 09; upper: Haynes, 16  
 Dinosaurs, Ft. Pierre shales: Douglass, 02b; Laramie: Cope, 88s  
*Dryopteris*, Judith River formation: Knowlton, 15  
 Figs, fossil: Knowlton, 11d  
 Flora, Great Falls coal field: Newberry, 91  
 Fort Benton beds: Douglass, 03  
 Fort Union beds vertebrates: Douglass, 08  
*Gastropoda*, Cretaceous: Meek, 56, 56a  
 General: Whitfield, 86b  
*Hesperornis*: Shufeldt, 15c  
*Hoploparia*, Cretaceous: Whitfield, 07  
 Horses: Douglass, 08b  
*Invertebrata*: Meek, 57, 58b; Whitfield, 76  
 Jefferson limestone fauna: Kindle, 08b  
 Judith River fauna: Stanton, 05; White (C A), 77a; plants: Knowlton, 05  
 Judith River region: Leidy, 59f  
 Kootanie plants, Great Falls coal field: Knowlton, 06a  
 Laelaps: Cope, 77p  
 Liverwort, Fort Union beds: Knowlton, 08  
 Lizards, Oligocene: Douglass, 08c  
 Loup Fork artiodactyls: Cope, 78o  
 Mammalia: Douglass, 05; Deep River beds: Scott, 95b; White River beds: Douglass, 02  
*Mariacrinus?* *insuetus*: Raymond (P E), 12b  
*Merycochoerus*: Douglass, 00  
*Merycoidodonts*, Miocene: Douglass, 07a, b  
 Mollusca: Meek, 56d; Cretaceous: Meek, 56b; Tertiary: Meek, 56c  
*Myrmecoboides*, marsupial, Fort Union: Gidley, 15  
 Neocene lake beds: Douglass, 99  
*Olenopsis* from Cambrian: Walcott, 10  
 Oligocene plants: Jennings, 18  
 Pisces, Judith River: Leidy, 56d  
*Pityoxylon*, Gallatin basin: Knowlton, 96d

## Montana—Continued.

*Paleontology*—Continued.

- Plants, Bozeman coal field: Knowlton, 93a  
 Fort Union beds: Knowlton, 93; Ward (L F), 89a  
 Great Falls coal field: Fontaine, 93  
 Porcupine Butte: Knowlton, 02c  
*Preissites*, lower Yellowstone: Knowlton, 94a  
*Procamelus*, Miocene: Douglass, 09  
*Protoblattid* family, lower Cretaceous: Mitchell, 08  
*Ptilodus*: Gidley, 09  
 Reptilia, Fort Union beds: Cope, 76g  
   Fox Hills beds: Cope, 77e  
   Judith River: Cope, 77e; Leidy, 56d  
*Rhinoceroses*, Oligocene and Miocene: Douglass, 08a  
*Schoenaster?* *montanus*: Raymond (P E), 12b  
*Selaginella*, northeastern Mont.: Knowlton, 16a  
 Sun River district: Powers, 14  
*Teleorhinus*, Cretaceous: Osborn, 04c  
 Tertiary: Douglass, 05; Meek, 60b; Mammalia: Cope, 78i  
*Titanotherium* beds fauna, Pipestone Springs: Matthew (W D), 03b  
 Torrejon mammals: Douglass, 02c  
 Tortoise, Laramie beds: Riggs, 06  
*Triceratops*: Beasley, 03a; Lull, 03  
 Turtles, Judith River beds: Hay (O P), 04a  
*Unionidæ*, Laramie: Whitfield, 07a  
*Vertebrata*, Fort Union beds: Douglass, 08  
   Tertiary: Douglass, 03a  
*Xantholithes propheticus*, Fort Union group: Ward (L F), 89a
- Petrology.*  
*Acmite* trachyte, Crazy Mountains: Wolff, 93  
 Baked shale and slag formed by burning of coal beds: Rogers (G S), 17  
 Bearpaw Mountains: Weed, 96c  
 Boulder, Hot Springs: Weed, 00a  
 Boulder batholith: Knopf, 14c  
 Butte copper veins: Kirk (C T), 12  
 Castle Mountain district: Weed, 96a  
 Central Mont.: Pirsson, 05a  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Corundum syenite (uralose): Rogers (A P), 11b  
 Crazy Mountains: Wolff, 85  
 Dillon quadrangle: Winchell (A N), 14  
 Elkhorn district, Jefferson Co.: Barrell, 01  
 Ellipsoidal lavas, Glacier National Park: Burling, 16a  
 Eruptive rocks: Lindgren, 86; Gallatin, Jefferson, and Madison cos.: Merrill (G P), 95b  
 General: Lindgren, 91a  
 Granite, Butte: Weed, 99c  
 Haystack stock: Emmons (W H), 08  
 Highwood Mountains: Johnston-Lavis, 96; Pirsson, 05; Weed, 95a  
 Judith Mountains: Weed, 98  
 Little Belt Mountains: Pirsson, 00  
 Little Rocky Mountains: Weed, 96b  
 Marysville district: Barrell, 07  
 Missouriite, Highwood Mountains: Weed, 96d  
 Nepheline rocks, Crazy Mountains: Wolff, 85a  
 Northern Mont.: Lindgren, 93a  
 Northwestern Mont.: Calkins, 09



## Montana—Continued.

*Petrology—Continued.*

- Philipsburg quadrangle: Calkins, 09b  
 Phonolitic rocks: Pirsson, 95a  
 Purcell Mountain Range: Daly (R A), 06  
 Shonkin Sag and Palisade Butte laccoliths,  
     Highwood Mountains: Weed, 01b  
 Sodalite syenite: Lindgren, 93a  
 Sweet Grass Hills: Weed, 95b  
 Three Forks region: Haynes, 16a; Merrill (G P),  
     93  
 Volcanic ash: Merrill (G P), 86a  
 Volcanic rocks: Eccles, 81; Iddings, 96a; Rut-  
     ley, 81  
 Yogo Gulch: Pirsson, 97  
 Yogo Peak: Weed, 95c

*Physical geology.*

- Anticlines, Blackfeet Indian Reservation:  
     Stebinger, 17a  
 Birch Creek-Sun River area, northwestern  
     Mont.: Stebinger, 18  
 Boulder batholith: Billingsley, 15; Lawson, 14a  
 Boulders due to rock decay: Upham, 04a  
 Cabinet Range: Wood (H R), 93  
 Earth movements at Butte: Chapman (R H),  
     08, 08a  
 Fault, overthrust: Rogers (G S), 13b  
 Faulting, Bitterroot Mountains: Lindgren, 05j  
 Glaciers, northwestern Mont.: Grinnell, 98;  
     Rocky Mountains: Chaney, 95, 96  
 Judith Mountains: Weed, 98  
 Laccoliths: Weed, 97a  
 Lake Basin Field: Hancock, 17  
 Landslide: Henton, 07  
 Lewis overthrust: Willis, 02  
 Lombard overthrust: Haynes, 16a  
 Metamorphic products from burning of coal  
     beds: Allen (J A), 74; Rogers (G S), 17  
 Musselshell Valley, anticlines: Bowen (C F),  
     18e  
 Overthrust, Rocky Mountains: Willis, 02a  
 Philipsburg quadrangle: Calkins, 15  
 Rocky Mountains, structure: Chapman, 00  
 Sublacustrine glacial erosion: Davis (W M),  
     14b, 17c  
 Three Forks quadrangle: Peale, 96  
 Vein formation, Boulder Hot Springs: Weed,  
     00c

*Physiographic geology.*

- Big Horn Mountains, glacial geology: Salisbury,  
     06b  
 Bitterroot Forest Reserve: Goode, 98  
 Butte district, physiographic conditions at  
     time of ore enrichment: Atwood, 16  
 Cliff Lake, origin: Mansfield, 11  
 Continental divide at Butte, shifting: Weed,  
     06d  
 Flathead Lake region: Elrod, 03  
 Flaxville gravel: Collier, 18  
 Fracture valley system: Iddings, 04  
 Garnet Range: Pardee, 18  
 General: Hayden, 76b  
 Glacial drift: White (C A), 84c  
 Glacial lake Missoula: Pardee, 10a; Stone (R W),  
     14c

## Montana—Continued.

*Physiographic geology—Continued.*

- Glaciation: Davis (W M), 17c  
 Crazy Mountains: Mansfield, 08a, 09  
 Deer Creek valley: Hershey, 12  
 western Mont.: Wood (H R), 92b  
 Yellowstone Valley: Weed, 93  
 Glacier National Park: Campbell (M R), 14 b, c  
     glaciation: Alden, 14  
     glaciers: Alden, 14a  
     pre-Wisconsin drift: Alden, 12, 13  
 Granites, Carbon Co.: Kimball, 99  
 High gravels, age: Collier, 17a  
 Iceberg Lake, Glacier National Park: Freeman  
     (O W), 16a  
 Kewatin ice sheet, Montana lobe: Calhoun, 06  
 Lewis and Livingston ranges: Matthes, 04;  
     Willis, 02  
 Lewis Range: Matthes, 05  
 Little Bitterroot Valley: Meinzer, 16  
 Mission Range: Davis (W M), 15 c, h, 16b  
 Missouri River, Tertiary history: Bauer, 15  
 Montana batholith: Billingsley, 15  
 Northeastern Mont.: Collier, 18  
 Northwestern Montana: Culver, 92  
 Philipsburg quadrangle: Calkins, 15  
 Pleistocene, Sun River region: Stebinger, 17b  
 Pre-Jurassic baseleveling: Condit, 17  
 Rocky Mountain front: Martin (L), 06  
 Rocky Mountains: Chaney, 05; structure:  
     Chapman, 00  
 Shonkin sag: Weed, 95d  
 Sublacustrine glacial erosion: Davis (W M), 17c  
 Western Mont.: Hershey, 12

*Underground water.*

- Butte region: Meinzer, 14b  
 General: Mortson, 92  
 Great Falls region: Fisher (C A), 09a; Giant  
     Springs: Fisher (C A), 08  
 Little Bitterroot Valley: Meinzer, 16  
 Montana lobe of Kewatin ice sheet: Calhoun, 06  
 Monte Cristo ore deposits, Wash.: Spurr, 01  
 Montereian Hills, Que.: Dresser, 06a  
 Monterey folio, Va-W. Va. (no. 61); Darton, 99  
 Monterey series, Cal.: Louderback, 13; fauna:  
     Martin (B), 12  
 Montezuma district, Colo.: Patton, 09; Ritter, 08a  
 Montezumas Well, Ariz.: Blake (W P), 06  
 Monthly American Journal of Geology: Winchell  
     (N H), 02  
 Monticello area, Va.: Lambeth, 01  
 Monticulipora. *See* Bryozoa.  
 Mont Pelé. *See* Martinique.  
 Montreal River district. *See* Ontario.  
 Montserrat: Sapper, 03e  
 Monument Creek formation, age: Darton, 05i  
 Monument Creek group: Richardson (G B), 12  
 Moon.  
     Evolution: Gilbert, 92  
     Features: Shaler, 03  
     Geography: Meunier, 16a  
     Volcanoes: Dana (J D), 46b  
 Moorcroft oil field, Wyo.: Barnett, 14a  
 Moorefield shale fauna, Ark.: Girty, 11  
 Moose Mountain district, Alta.: Cairnes, 07; Dow-  
     ling, 06b  
 Moose Mountain iron range, Ont.: Bell (J J), 08



Moose River basin, Ont.: Parks, 00

Moose River sandstone, Maine: Clarke (J M), 09a

Morainal island, Nantucket: Curtis, 99

Morainal stone quarry, Richmond, Ind.: Moore (J), 97

Moraine Dome: Matthes, 14d

Moraines.

Alaska, Mount St. Elias: Russell, 92a; Yakutat Bay region: Tarr, 08, 09

California, Sierra Nevada, post-Pleistocene: Matthes, 17

Classification: Reid (H F), 97

Colorado, Arkansas Valley: Hayden, 76; Estes Park: Wooster, 18; San Juan Mountains: Atwood, 18

Correlation: Chamberlin (T C), 82

Derivation from englacial drift: Upham, 94b

Formation conditions: Upham, 95c

General: Chamberlin (T C), 83b; Dawson (J W), 83h; Frisbie, 80; Reagan, 08a; Salisbury, 94b

Illinois, northeastern: Leverett, 89c

Indiana: Dryer, 97; Leverett, 15; Thompson (M), 86

Allen Co.: Dryer, 89

Lagrange Co.: Dryer, 94

Noble Co.: Dryer, 94

northern: Leverett, 89c

Steuben Co.: Dryer, 92

Wabash-Erie region: Dryer, 94a

Whitley Co.: Dryer, 92

Kansas, Shawnee and Wabaunsee cos.: Smith (B B), 96a, 98e

Maine: Stone (G H), 87

Massachusetts, Cape Cod district: Shaler, 98a central: Tarr, 92d

Charles River valley: Shaler, 70b

Michigan: Leverett, 15

Minnesota: Todd, 96d, 98a; Upham, 81, 84f, 89g; northeastern: Upham, 94

Missouri Coteau: Todd, 85

New England: Hitchcock, 92a; Katz, 16; Wright (G F), 79; Newington moraine: Katz, 17

New Hampshire, Bethlehem: Goldthwait, 16

New York: Leverett, 95a

Crown Point region: Barker, 16

Finger Lake region: Dryer, 04

Niagara quadrangle: Kindle, 13c

Seneca and Cayuga valleys: Tarr, 05a

Staten Island: Hollick, 99

Thousand Islands region: Cushing, 10a

Watkins Glen-Catatonk district: Williams (H S), 09

North Dakota: Todd, 96; Tower quadrangle Willard, 06f

Nova Scotia, Prince Edward Island: Bain (F), 85a

Ohio: Leverett, 91, 92; Holmesville: Cole (G G), 18; Maumee Valley: Gilbert, 73

Ontario, Galt moraine: Taylor (F B), 99a

southwestern: Taylor (F B), 10a, 12, 13c

Toronto region: Taylor (F B), 13b

Pennsylvania: Lewis (H C), 83a; Williams (E H), 17

Northampton Co.: Prime, 79a

terminal moraine: Lewis (H C), 83d; Wahn-schaffe, 92

Moraines—Continued.

Pennsylvania, western: Leverett, 91

Rhode Island, Queen's River moraine: Woodworth, 96b

Rhythmic accumulation: Upham, 97c

South Dakota: Todd, 96; southeastern: Todd, 99

Terminal moraines: Upham, 79

Wisconsin, Kettle Moraine: Chamberlin (T C), 78a, b, 80a

southeastern: Alden, 18

terminal moraine: Wahn-schaffe, 92

Moraines and maximum diurnal temperature, Todd, 01b

Moravia quadrangle, N. Y.: Carney, 09c

Moropus: Barbour (E H), 08; Holland, 13; Matthew (W D), 18c; skeletal parts: Barbour (E H), 09

Morosaurus: Gilmore, 07; Osborn, 06a; Riggs, 01a

Morrison formation: Mook, 15, 16, 18; Stanton, 05b; age: Berry, 15e; Darton, 05k; Lee (W T), 15b; Lull, 15a; Osborn, 15c; Schuchert, 18a; Stanton, 15; Colorado: Lee, 01; invertebrate fauna: Stanton, 15

Morrison shales, Colo.-New Mex.: Lee (W T), 02

Morristown folio, Tenn. (no. 27): Keith, 96a

Morton, S. G., biography: Meigs, 51

Mosasauridae: Baur, 92; Holland, 08

Mosaurus: Gibbes, 50a; Leidy, 57d; Whitfield, 00c

Mosses, fossil: Britton (E G), 07

Mother Lode, Cal.: Storms, 12b

Mother Lode folio, Cal. (no. 63): Ransome, 00

Mottling of limestones: Wallace (R C), 13

Moulin potholes in New York City: Julien, 10

Moulin work: Gilbert, 06a

Mounds, natural.

Basalt mounds of Columbia lava: Piper, 05

California, San Diego: Barnes, 79

Formation of, by crystallization: Hess, 10e

Gulf coastal region: Hager, 04; Kennedy, 17

Illinois, St. Clair Co., Monk's Mound: Crook, 17

Mississippi Valley: Crook, 15

Origin: Branner, 05; Bushnell, 05; Campbell (M R), 06b; Crook, 15, 18; Farnsworth, 06; Hilgard, 05; Hill (R T), 06; Hobbs, 07e; Kennedy, 17; Purdue, 05e; Reagan, 08; Spillman, 05; Udden, 06; Veatch, 99, 05b, 06, 06e, g

Prairie mounds, origin: Le Conte, 77a

Washington, Olympia: Rogers (G O), 93

Mount Adams, glaciers: Reid (H F), 02, 06

Mount Bohemia, intrusive rocks: Wright (F E), 09b

Mount Desert Island, Me.: Davis (W M), 94e; Frazer, 06

Mount Diablo, Cal.: Louderback, 09a

Mount Greylock, Mass.: Dale, 94, 06

Mount Holly Springs, Pa.: Stose, 07a

Mount Hood, glaciers; Reid (H F), 02, 06

Mount Mazama: Martin (L), 13b

Mount Mitchell folio, N. C. (no. 124): Keith, 05a

Mount Rainier, Wash.: Landes, 05b; Smith (G O), 00d; Williams (J H), 10; Nisqually Glacier: Le Conte (J N), 06

Mount Rainier National Park: Matthes, 14, 16a

Mount Shasta: Diller, 15a

Mount Sterling-Big Sandy River: Crandall, 77a

Mount Stuart folio, Wash. (no. 106): Smith (G O), 04



- Mount Taylor region, N. Mex.: Johnson (D W), 07a; Shimer, 08a
- Mount Yamaska, Que.: Young (G A), 06
- Mountain chains, parallelism: Desor, 501
- Mountain system of North America: Marcou, 54, 55d
- Mountains. *See* Orogeny.
- Moyie sills, B. C.: Bailey (P P), 13
- Mud cracks: Kindle, 17a; Moore (E S), 14b; Nova Scotia: Kindle, 14c
- Mud furrows: Hall, 43d, e
- Mud lumps, Mississippi delta: Beauregard, 66; Delafield, 29; Harris, 99a; Hilgard, 70c, 71; Howell, 70; Kohl, 62; Lawes, 11; Long, 58; Shaw (E W), 13, 14; Simons, 82; Thomassy, 60, 60a.
- Mud volcanoes.  
California, Colorado Desert: Veatch (J A), 57  
Trinidad: Arnold, 12; Bosworth, 12; Montser-rat, 67
- Muddy Creek oil field, Carbon Co., Wyo.: Jamison, 12
- Mudge, B. F., biography: Parker (J D), 81a; Williston, 99d
- Multiple glaciation in New York: Fairchild, 09a
- Multiple working hypotheses: Chamberlin (T C), 97c
- Multituberculata: Broom, 14a
- Munuscong Islands: Taylor (F B), 95
- Murphysboro quadrangle, Ill.: Shaw (E W), 10a
- Murphysboro-Herrin folio, Ill. (no. 185): Shaw (E W), 12b
- Murray, Alexander, biography: Bell (R), 92b
- Murray gold belt, Idaho: Lammers, 07
- Muscogee folio, Okla. (no. 132): Taff, 06
- Muscovite, Maine: Bastin, 11
- Museums and collections.  
Columbia College, School of Mines: Russell, 79  
Lacoe collection: Goode, 96  
Lewis Brooks Museum: Fontaine, 79a  
New York Botanical Garden, paleobotanic col-lections: Hollick, 11  
South Carolina College, cabinets: Martin (D S), 06  
Vertebrate collections: Woodward (A S), 90
- Musical sand: Bolton, 84, 90; Hawaiian Islands: Bolton, 90; Pacific coast: Bolton, 91
- Mycterops: Cope, 86t
- Myers Creek district, Wash.: Umpleby, 11
- Mylagaulodon, John Day beds: Sinclair, 03a
- Mylodon. *See* Mammalia.
- Mylostoma: Dean, 01a; Eastman, 06a, 07
- Mylostomid palatal dental plates: Eastman, 09b
- Myriapoda.  
Air-breathing: Dawson (J W), 95a  
Archipolypoda, Carboniferous: Scudder, 82a; systematic position: Packard, 83a  
Carboniferous: Scudder, 84  
Euphoberiae, Carboniferous: Scudder, 81b  
General: Matthew (G F), 94a, 95a  
Illinois, Mazon Creek: Scudder, 90d  
Nova Scotia, Carboniferous: Dawson (J W), 60a; Scudder, 69, 73, 95a  
Palaeocampa: Scudder, 82b  
Quaternary, California: Grinnell, 08  
Trichiulus: Scudder, 86b
- Mytilus middendorffii, Alaska: Gratacap, 12a
- Nabesna-White River district, Alaska: Moffit, 09a, 10a
- Nageiopsis, revision: Berry, 10e
- Nampa folio, Idaho-Oreg. (no. 103): Lindgren, 04
- Nampa image: Wright (G F), 89a, 90b, 91a, 99
- Nanaimo group: Dawson (G M), 90d
- Nanaimo-Comox coal field: Poolc, 06
- Nanosaurus: Huene, 08b
- Nantahala folio, N. C.-Tenn. (no. 143): Keith, 07
- Nantasket area, Mass.: Johnson (D W), 06a
- Nantasket Beach, Mass.: Johnson (D W), 10d; Reed (W G), 08
- Nantucket Island, Mass.: Shaler, 89c; Wilson (J H), 06; shore-line: Gulliver, 09
- Naosaurus: Osborn, 07b
- Naphtha, Cuba, Santa Clara: Richardson (C), 10a
- Naples fauna, western N. Y.: Clarke (J M), 04
- Naples quadrangle, N. Y.: Clarke (J M), 04b
- Narragansett Basin: Shaler, 99
- Nason, H. B., biography: Chamberlin (T C), 96b
- Natchez formation: Chamberlin (T C), 96c
- National mining district, Nev.: Lindgren, 11c, 15; Winchell (A N), 12a
- Natron deposits, Costilla Co., Colo: Headden, 09
- Natural bridges.  
Arizona: Deckert, 96; Gardiner, 85  
Formation: Cleland, 05, 10, 11a; Dake, 14; Fowke, 97  
Indiana, Parke Co., Mansfield: Dryer, 13; Shades: Barrett, 17a  
Kentucky: Miller (A M), 98a  
South Dakota, Black Hills: Darton, 01a; due to stream meandering: Barnett, 08  
Tennessee, Cumberland Mountains: Nelson (W A), 15  
Utah: Cummings, 10; Dyar, 04; Parsons (T S), 07; Winchell (N H), 04c; Winslow, 98  
Nonnezoshe: Pogue, 11c  
Rainbow bridge: Pogue, 11c  
Virginia: Ashburner, 84c, 85c; Deckert, 96; Gilmer, 18; Walcott, 93a  
Rockbridge Co.: Featherstonhaugh, 32b  
Scott Co.: Long, 32  
Wyoming, eastern: Barnett, 12
- Natural coke.  
Mexico, Sonora: Dumble, 00b; Ochsenius, 00  
Virginia: Wurtz, 75  
Chesterfield Co.: Raymond, 83  
Richmond: Rogers (W B), 54a; Stevens (R P), 74b
- Natural gas. *See also names of gas-producing States.*  
Accumulation: Clapp (F G), 11e; Johnson (R H), 10, 12; Orton, 88a  
anticlinal theory: Chance, 86; Clapp (F G), 09a; Höfer, 10a; White (I C), 85d, 17; and hydraulic theories of accumulation: Munn, 09, 09a  
Appalachian region: Munn, 12f  
diastrophic theory: Daly (M R), 16  
Anticlinals: White (I C), 86  
Appalachian and central States: Ashley, 12  
Appalachian fields: Clapp (F G), 10b  
Appalachian geosyncline, deep sand possi-bilities, West Virginia: Reger, 16  
Arkansas, Fort Smith-Poteau field: Smith (C D), 14  
Canada: Brumell, 88a



## Natural gas—Continued.

- Capillary concentration: Washburne, 14b  
 Classification of fields based on structure: Clapp (F G), 10a  
 Connate water in oil and gas sands: Johnson (R H), 15; Shaw (E W), 15a; Washburne, 15a  
 Dakota sand, oil, gas and water content: Huntley, 15a  
 Duration of supply: Claypole, 88a; Platt (F), 76a  
 Evaporation of water at depth by natural gases: Mills (R V A), 17  
 Gas sands: Knapp (I N), 14  
 Gasoline vapor content change: Sieplein, 18  
 General: Arnold, 17a; Ashburner, 85d, 86h, 87a, b; Bownocker, 09; Carll, 87; Clapp (F G), 10, 14; Gorby, 89a, 93; Hager, 15b; Haworth, 09a; Hill (B), 07; Johnson (R H), 16; Knapp (I N), 12a; Lesley, 86d, f; McGee, 91a; Matteson, 17a; Newberry, 71k, 73d; Northrop, 16a; Oliphant, 97a; Orton, 89b; Shaler, 87d; Thompson (M), 86b; Topley, 92; Weeks, 86; Westcott, 13; White (I C), 85d, e, 11, 11a; Wurtz, 71a; Wyer, 18  
 Geologic distribution: Ashburner, 87  
 Geology: Gould, 12a; Appalachian region: Bownocker, 09; outline: Clapp (F G), 13  
 Map, productive fields, 1908: Day (D T), 09b; United States: Day (D T), 14b  
 Migration and separation of hydrocarbons, relation to structure: Trumbull, 16b  
 Movement through rocks: Washburne, 18; Ziegler, 18a  
 Mud lumps of Mississippi River: Shaw (E W), 14  
 Occurrence, mode of: Clapp (F G), 09b  
 Occurrence and source: Haworth, 08  
 Origin: Ashburner, 86h; Bownocker, 16; Clapp (F G), 14; Newberry, 82; Orton, 88a, 89, 90, 91; Phillips (F C), 97; Sadtler, 97; White (D), 15a  
 Practical value of oil and gas bureaus: Matteson, 17a  
 Pressure, origin: Miller (A M), 00; Orton, 90a, c, d  
 Quaquaversal structure: Clapp (F G), 12  
 Structural classification of natural gas fields: Clapp (F G), 17  
 United States: Clapp (F G), 13; Day (D T), 09a; U S G S, 83  
 Volcanic origin: Coste, 04

Navajo country: Gregory (H E), 17

Navassa.

General: Gaussoin, 66

*Economic geology.*

Phosphate: D'Invilliers, 91a; Gaussoin, 66

## Nebraska.

- Badlands: Kenyon, 95  
 Bibliography: Barbour, 02a  
 Central Nebr.: Russell (F W), 91  
 Crystalline rock, Pawnee Co.: Russell (F W), 88  
 Elk Point quadrangle: Todd 08  
 General: Hayden, 67; Stansbury, 52; Warren, 58

## Nebraska—Continued.

- Geological survey, history: Barbour, 12b  
 initial work: Barbour, 00  
 progress: Barbour, 02c  
 publications: Barbour, 10  
 reports: Barbour, 01b, 07b  
 Hot bluff: Kedzie, 75  
 Loup River region: Hicks, 93a  
 Morrill geological expeditions: Barbour (C A), 00, 06b, 07c  
 Nehawka region: Winchell (N H), 03f  
 Rocks of Nebraska: Barbour, 15d  
 Salt well, Lincoln: Russell (F W), 88a  
 Soils: Barbour, 95b, 96b, 97a, 98, 99; Hicks, 89  
*Economic geology.*  
 Alkali deposits: Barbour, 16c  
 Barites: Barbour, 98a; Franklin Co.: Burnett, 16  
 Cass Co.: Woodruff, 06  
 Cement materials: Barbour, 13b; Eckel, 13; Republican Valley: Darton 10  
 Clay: Barbour, 13a, 17; Gould, 01  
 Coal: Barbour, 16; Hayden, 68d; Pepperberg (R V), 10; White (C A), 68d; Peru: Barbour, 06e, 07a  
 Diatomaceous deposits: Barbour, 96a, 97d  
 Diatomite, Thomas Co.: Elmore, 14  
 Flint ballast, Gage Co.: Barbour (E H), 09a  
 General: Am Bur Mines, 66; Barbour, 95c, 03, 15c; Hayden, 72b  
 Geyserite: Hicks, 88  
 Glass-sand deposits: Burchard, 07d  
 Gold: Barbour, 99c  
 Lignite, Dakota Co.: Burchard, 04; Missouri Valley: Burchard, 04a  
 Limestone: Fisher (C A), 01a; Cass Co.: Woodruff, 06  
 Mineral resources: Barbour, 10a  
 Natural fuels: Barbour, 16  
 Oil and gas possibilities: Condra, 06b  
 Phosphates: Fulmer, 93  
 Potash: Condra, 18; northwestern Nebr.: Ziegler, 15  
 Pumicite: Barbour, 16a  
 Quartzite, green: Barbour, 15b  
 Rocks of Nebr.: Barbour, 15d  
 Salt, Lincoln: Hicks, 87a  
 Sand: Condra, 17  
 Sand and gravel resources: Condra, 08a  
 Volcanic ash: Barbour, 96, 97b, 98d, 02, 16a; southwestern Nebr.: Salisbury, 96e; Todd, 97  
*Historical geology.*  
 Antelope Creek, near Lincoln: Anon, 88  
 Bad lands region: Darton, 98e; Hall, 55a; section: Blake (W P), 56d  
 Borings: Hicks, 87; Brownville, Hicks, 85  
 Camp Clarke quadrangle: Darton, 03  
 Carboniferous: Barbour, 12; Geinitz, 66, 67; Meek, 65b, 72; Prosser, 97c, 99b  
 Cass Co.: Woodruff, 06  
 Coal Measures: Beede, 99  
 Cretaceous: Capellini, 66; Meek, 58c, 65b; north-eastern Nebr.: Condra, 04  
 Dakota Co.: Burchard, 04  
 Dakota group: Gould, 01e; south of Platte River: Hicks, 85a



## Nebraska—Continued.

*Historical geology*—Continued.

- Dakota sandstone: Gould, 00b  
 Diatomaceous earth: Hicks, 88c  
 Eastern Nebr.: Marcou, 67  
 Elk Point quadrangle: Todd, 08  
 General: Am Bur Mines, 66; Aughey, 80; Barbour, 95c, 03; Darton, 18a; Eggleston, 66c; Engelmann (H), 58; Hayden, 56, 59, 60, 62, 67, 72b; Hicks, 90, 90a, 93; Marcou, 58a, 60b, 64; Warren (G K), 59  
 Jefferson Co.: Carmony, 03  
 Laramie: Fisher (C A), 02  
 Lincoln: Fisher, 00  
 Nebraska City: Beede, 98f  
 Miocene, western Nebr.: Peterson, 06c  
 Missouri River Valley: Condra, 08  
 Niobrara River region: Leidy, 59h  
 Northwestern Nebr.: Hatcher, 94  
 Patrick and Goshen Hole quadrangles: Adams (G I), 02  
 Pennsylvanian formations, southeastern Nebr.: Condra, 15  
 Permian: Geinitz, 67; Hicks, 86; Knight (W C), 99a; Marcou, 64b, 67a, 68; Prosser, 97c; Blue Valley: Beede, 00b  
 Pliocene, western Nebr.: Matthew (W D), 09c  
 Quartzite, Niobrara region: Hicks, 88b  
 Quaternary volcanic deposits: Todd, 86  
 Republican River Valley: Condra, 07  
 Salt well, Lincoln: Russell (B P), 88  
 Scotts Bluff quadrangle: Darton, 03a  
 Sioux Co.: Cook (H J), 15a  
 Snake Creek beds, Sioux Co.: Sinclair, 15  
 Southeastern Nebr.: Darton, 98; Meek, 67e; Darton, 99f; Hayden, 69b; Hicks, 88b; Russell (F W), 92  
 Titanotherium beds: Hatcher, 93a  
 Triassic, so-called: Meek, 59a  
 Volcanic ash, Omaha: Todd, 92a, 95c  
 Western Nebr.: Darton, 99a, 03b

*Mineralogy.*

- Barite, Franklin Co.: Burnett, 16  
 General: Barbour, 15c  
 Meteorites: Barbour, 01a  
 Ainsworth: Howell, 08, 08b; Tassin, 08  
 York: Barbour, 98c  
 Minerals of Nebr.: Barbour, 15c

*Paleontology.*

- Agate Spring fossil quarry: Peterson, 06b, 09  
 Amphibian, Tertiary: Cook, 17  
 Amphicyon, dentition: Cook (H J), 15  
 Ancient inhabitants: Barbour (E H), 07f  
 Anisomyon: Meek, 60  
 Bryozoa, Coal Measures: Condra, 02, 03  
 Calcsponge, Carboniferous: Clarke (J M), 97d  
 Camel, Miocene: Cook (H J), 09; Peterson, 11  
 Canidae, Oligocene: Hatcher, 02; White River beds: Scott (W B), 98a  
 Carboniferous: Geinitz, 66  
 coral, *Craterophyllum verticillatum*: Barbour (E H), 11a  
 eastern Nebr.: Meek, 72  
 eurypterids: Barbour, 14f  
 fishes: Eastman, 03a  
 flora: Pepperberg (R V), 10a  
 jellyfish: Barbour, 14h  
 plant tissue: Barbour, 15i

## Nebraska—Continued.

*Paleontology*—Continued.

- Carnivora, Miocene: Cook (H J), 09c; Peterson, 09a, 10  
 Chalcedony-lime nuts, Badlands: Barbour, 98b  
 Chelonia: Leidy, 52a, b  
 Cretaceous: Capellini, 66; Conrad, 52a; Shumard (B F), 58e  
 microscopical fauna: Woodward (A), 95  
 Plantae: Heer, 58; Lesquereux, 68a  
 Cynarctus: Barbour, 14e  
 Daimonelix: Barbour, 92, 92a, 95a, 97c; Kenyon, 95; Peterson, 04a  
 Dakota fauna, Jefferson Co.: White (C A), 94  
 Diatoms: Barbour, 96a, 97d; Elmore, 96, 98, 14a  
 Miocene: Barbour (E L), 10  
 Thomas Co.: Elmore, 14  
 Diceratherium: Cook (H J), 12a; Peterson, 11b, 12b  
 Dinartotherium, Pleistocene, Cass Co.: Barbour, 16b  
 Dinictis: Lucas (F A), 98a  
 Dinochocrus, Loup Fork beds: Peterson, 05b  
 Dog, Loup Fork beds: Cope, 90g  
 Elephas hayi, Crete: Barbour, 15j  
 Elotherium: Barbour, 12a  
 Emys: Leidy, 52e  
 Epiaphelops: Cook (H J), 12  
 Epidermis, Carboniferous: Whitford, 16b  
 Equidae: Leidy, 68d  
 Equus: Marsh, 68a  
 Eurypterids: Barbour, 12, 14b  
 Eusmilus: Barbour, 15  
 Fungus, Pliocene: Whitford, 14  
 General: Barbour, 95c, 03, 15e; Hayden, 59  
 Geomys from loess: Leidy, 67a  
 Helicoceras, Chadron: Whitfield, 01  
 Hickory nuts, Badlands: Knowlton, 01b  
 Horse, Miocene: Loomis, 08b  
 Human remains in the loess: Barbour, 06a, 07, 07d, e; Gilder, 07, 07a; Shimek, 08  
 Hypohippus: Barbour, 14  
 Invertebrata, upper Missouri: Meek, 65a  
 Loup Fork fauna: Cope, 80d; Scott (W B), 90a  
 Mammalia: Leidy, 50a, b, 52b, 53f, 69  
 Antelope Station: Marsh, 69d  
 Devil's Gulch, Brown Co.: Barbour, 14a  
 Niobrara Valley: Leidy, 58c  
 Pliocene: Leidy, 58a  
 Mammoth: Barbour, 13, 15f; Sioux Co.: Cook (H J), 14  
 Man and elephant: Holmes (N), 76  
 Mastodon: Leidy, 58b; Cherry Co.: Barbour, 14d, 15h  
 Medusina, Carboniferous: Barbour, 14c  
 Meteoreodon, Brown Co.: Barbour, 17b  
 Mollusca, Carboniferous: Meek, 71d  
 Moropus, skeletal parts: Barbour (E H), 09; skull: Barbour (E H), 08  
 Mylodon garmani: Allen (G M), 13  
 Northwestern Nebr.: Osborn, 08c  
 Ogmodirus martini, Niobrara: Williston, 13e  
 Oligocene fossil eggs, Harrison: Troxell, 16a  
 Oreodon, Miocene: Bettany, 73  
 Oxydactylus, Loup Fork beds: Peterson, 04  
 Paleontological trip: Osborn, 07d  
 Paleozoic, list: Bierbauer, 91



## Nebraska—Continued.

*Paleontology*—Continued.

- Paramylodon, Pleistocene: Brown (B), 03  
 Permian: Knight (W C), 99a; Gage Co.: Beede, 01  
 Pisces, Carboniferous: St. John, 70b, 72  
 Plant cuticles, Graneros shale: Whitford, 16  
 Plant tissue, Carboniferous: Barbour, 14f  
 Plants, Cretaceous: Capellini, 66; and Tertiary: Lesquereux, 71  
 Pleistocene, Hay Springs: Matthew (W D), 02f; western Nebr.: Matthew (W D), 18  
 Pliocene fauna: Matthew (W D), 09e  
 Poebrotherium (camel), Oligocene: Troxell, 17  
 Prehistoric man: Blackman, 07  
 Primitive race of men: Osborn, 07f  
 Proboscidea, ligamentum teres: Barbour, 15a, 16d  
 Proboscidean, Miocene: Cook (H J), 09a  
 Procamelus, Niobrara Valley: Leidy, 58f  
 Promerycochoerus, Sioux Co.: Peterson, 14d  
 Rhinoceros: Leidy, 52d; Pohlig, 94  
 Loup Fork beds: Hatcher, 94a  
 Miocene, Sioux Co.: Barbour, 06, 06f; Cook (H J), 09b, 12, 12a  
 Rhinocerotidæ of the Miocene: Loomis, 08a  
 Rodentia, Sioux Co.: Peterson, 05  
 Sioux Co.: Cook (H J), 12b; bone beds, slab from: Barbour (E H), 09b  
 Snake Creek beds, Sioux Co.: Sinclair, 15  
 Snake Creek fauna: Matthew (W D), 18  
 Stenomylus: Loomis, 10  
 Stenomylus gracilis: Peterson, 08  
 Stenomylus hitchcocki: Peterson, 11a  
 Suilline remains, Miocene: Peterson, 06  
 Syndoceras, Sioux Co.: Barbour, 05, 05a, 06c  
 Teleoceras, Miocene: Olcott, 09  
 Tephrocyon: Cook (H J), 14a  
 Testudo, Snake River Pliocene, Cherry Co.: Barbour, 15g  
 Tetrabelodon osborni, Boyd Co.: Barbour, 16e, 17a  
 Titanotherium dispar, Sioux Co.: Hatcher, 02a  
 Turtles from Harrison beds: Loomis, 09  
 Tortoises: Leidy, 51, 52h  
 Ungulates: Leidy, 51a  
 Vertebrata: Leidy, 75  
 Bad Lands: Leidy, 53  
 Miocene: Peterson, 06c  
 Niobrara Valley: Leidy, 58e  
 White River beds: Cope, 91c  
 White River fauna: Scott (W B), 87, 90a  
 Woods, fossil: Platen, 08

*Petrology*.

- Concretions, Dakota clays, Burnham: Burnett, 16a  
 Rocks of Nebr.: Barbour, 15d  
 Volcanic ash, southwestern Nebr.: Merrill, (G P), 85a, d

*Physical geology*.

- Concretions, Pierre shale: Barbour (C A), 01  
 General: Darton, 18a  
 Hot bluffs: Rachel, 78  
 Lagoon formation, Custer Co.: Hicks, 91  
 Sand concretions: Barbour, 01  
 Sandstone dikes: Hay (R), 92  
 Sandstone pinnacles: Darton, 12a

## Nebraska—Continued.

*Physiographic geology*.

- Aftonian beds: Shimek, 10b  
 Badlands: Hall, 55a  
 Drift deposits: Barbour (E H), 13c; Todd, 81, 89  
 General: Aughey, 80; Barbour, 03; Condra, 06  
 Glacial phenomena: Barbour, 00a; Condra, 06a  
 Hat Creek bad lands: Kingsley, 91  
 High Plains: Johnson (W D), 01  
 Kansan drift deposits: Barbour, 14g  
 Loess, Plattsmouth: Child, 80  
 Loup River: Todd, 92d  
 Loup Fork rivers: Davis, 92c; Hicks, 92, 92a  
 Platte River: Todd, 92d  
 Pleistocene, Missouri Valley: Shimek, 10a; Omaha region: Shimek, 11d  
 Pre-Wisconsin: Todd (J E), 12  
 Superficial deposits: Aughey, 76  
 Todd Valley: Condra, 03b
- Underground water*.
- Artesian water: Gregory (J W), 90  
 Camp Clarke quadrangle: Darton, 03  
 Elk Point quadrangle: Todd, 08  
 General: Barbour, 99a; Hicks, 90, 93  
 Intermittent wells: Todd, 83a  
 Lodgepole Valley: Meinzer, 17a  
 Missouri River Valley: Condra, 08  
 Republican River Valley: Condra, 07  
 Scotts Bluff quadrangle: Darton, 03a  
 Southeastern Nebr.: Darton, 98  
 Underflow, South Platte Valley: Slichter, 06a  
 Western Nebr.: Darton, 99a, 03b
- Nebular hypothesis: Chamberlin (T C), 00; testing of: Chamberlin (T C), 00a  
 Nectosaurus: Merriam (J C), 08a; Moodie, 09; osteology: Merriam (J C), 08a  
 Needle Mountains folio, Colo. (no. 131): Cross, 05b  
 Neff, P. G., biography: Cushing, 04  
 Nelchina-Susitna region, Alaska: Chapin, 18  
 Nelson area, B. C.: LeRoy, 12a  
 Nematophyton: Prosser, 02b  
 Neocalamites, Richmond coal field, Virginia: Berry, 12a  
 Neocene: Dall, 92  
 Neosho River section: Beede, 06b  
 Nepesta folio, Colo. (no. 135): Fisher (C A), 06a  
 Nepheline syenite, Ontario: Adams (F D), 08c  
 Nephelite: Foote (H W), 12; composition: Bowen (N L), 12  
 Nephrite and jadeite: Clarke (F W), 88  
 Neptunite crystals, San Benito Co., Cal.: Ford (W E), 09  
 Nettleroth, Henry, biography: Bassler, 09b  
 Neuces folio, Tex. (no. 42): Hill (R T), 98a  
 Neva limestone, Okla.: Beede, 14  
 Nevada.
- Bodie district: Becker, 80  
 Columbus Marsh muds, composition: Hicks (W B), 15  
 Comstock Lode, underground temperature: Church, 79b  
 Eureka district: Becker, 80  
 Fanglomerate: Lawson, 12c  
 General: Becker, 85; Gilbert, 74a; Jackson, 66a; Rath, 84d  
 Jefferson Canyon: Packard, 09  
 Meteor of 1894: Jenney, 09a



## Nevada—Continued.

Nevada Hills: Lawson, 12e  
 San Francisco district: Becker, 80  
 Soda Lakes, Fallon area: Lee (C H), 16  
 Southern Nev.: Wheeler (G M), 70, 75a  
 Truckee Basin: Taylor (L H), 02  
 Western Nev.: Conkling, 77, 78

*Economic geology.*

Alum, Esmeralda Co.: Spurr, 04d  
 Alunite, Bovard: Schrader, 13a, 14a; Sulphur, Humboldt Co.: Clark (I C), 18  
 Amarillo iron and phosphate deposits: Hershey, 08c  
 Antelope district: Schrader, 13  
 Antimonial silver-lead veins, Arabia district: Knopf, 18b  
 Asphaltite: Anderson (R), 09  
 Austin, ores: Taylor (H B), 12  
 Bannock mining district: Martin (A H), 10b  
 Battle Mountain district: Bandmann, 14  
 Borax: Hanks, 83  
 Building stones: Reid (J A), 04  
 Bullfrog mining district: Ransome, 07, 10c; Rice (C T), 06b; Tallman, 09  
 Camp Alunite: Hill (R T), 08d  
 Carbonate of soda, Great Basin: Knapp (S A), 98  
 Cave deposit, Butte Mountain: Young (G J), 15  
 Cedar Range, Nye Co.: Stevens (G R), 17  
 Cement materials: Eckel, 13  
 Cinnabar, western Nev.: Knopf, 15a  
 Coal, Carboniferous: Brown (A J), 74a  
 Esmeralda Co.: Hance, 13; Knapp (M A), 97; Spurr, 04c; Stoneham, 04  
 Osino: Cope, 73v  
 Como, Palmyra mining district: Cutler, 12  
 Comstock lode, Washoe: Becker, 75, 82, 82a; Church, 79, 86; Gratacap, 95, 99a; Hague (J D), 70; King (C), 70; Raymond, 85a; Thureau, 79  
 structure and genesis: Reid (J A), 05  
 vein systems: Smith (D T), 12  
 Contact quaquaversal: Bailey (J T), 03; Purington, 03  
 Copper deposits: Rose, 11; Selwyn-Brown, 08a; Weed, 06  
 Contact district: Bailey (J T), 03; Purington, 03; Schrader, 12  
 desert mines: Everette, 08  
 Ely district: Bullock, 07; De Kalb, 09; Herrick (R L), 08; Ingalls (W R), 07a; Ralph, 07; Spencer (A C), 13, 17; Weed, 12c; Whitman, 14  
 Giroux mines: Giroux, 06  
 Humboldt Co.: Ransome, 09d, e  
 Lida district: Root, 09  
 Lincoln Co., Bristol mine: Goodale, 10  
 Lyon Co., Nevada-Douglas mines: Read, 12; Yerington district: Carpenter (J A), 10a; Jennings, 07, 08; Yerington-Buckskin district: Goodale, 11  
 Mason mining district, Lyon Co.: Zehring, 90  
 Pioche: Abbott (J W), 07  
 Robinson district: Lawson, 06  
 southwestern Nev.: McCormick, 00  
 Ward: Plate, 07

## Nevada—Continued.

*Economic geology—Continued.*

Delamar mine, Meadow Valley Range: Emmons (S F), 01a, 02  
 De Lamar mines, Lincoln Co.: Miller (G W), 08a  
 Desert gold, silver, and copper mines: Everette, 08  
 Eastern Nev.: Hill (J M), 16  
 Egan Canyon district: Emmons (S F), 70  
 Ely district: Smith (F D), 00; Spencer (A C), 17  
 Esmeralda Co.: Turner (H W), 01b  
 Eureka district: Blake, 79; Chance, 08; Curtis 84, 84a; Hague, 92; Ingalls (W R), 07b; Keyes (W S), 79; Raymond, 79; Ruby Hill mines: Curtis, 84b  
 Elko, Lander, and Eureka cos.: Emmons (W H), 10  
 Fairview district: Greenan, 14; Zalinski, 07a  
 General: Becker, 85; Guillemain Tarayre, 67c, 69, 71; Hague (J D), 70; Louderback, 01; Stretch, 67; Thureau, 79; Wheeler (G M), 72; White (A F), 69, 71; Whitehill, 73  
 Gold: Ball (S H), 06a, 07; De Quille, 95; Reid (J A), 08d; Sharwood, 07a  
 Antelope district: Schrader, 13  
 Bannock mining district: Martin (A H), 10b  
 Battle Mountain region, Kimberly camp: Carpenter (J A), 10  
 Bullfrog district: Ransome, 07, 10c; Rice (C T), 06b  
 Camp Alunite: Hill (R T), 08d  
 Cedar Range district: Tiernan, 17  
 De Lamar mines, Lincoln Co.: Miller (G W), 08a  
 desert mines: Everette, 08  
 Elko, Lander, and Eureka cos.: Emmons (W H), 10  
 Ely district, Giroux mines: Giroux, 06  
 Esmeralda Co., Klondike district: Spurr, 06a  
 Fairview district: Rice (C T), 06d; Zalinski, 07a  
 Goldfield district: Barnes, 13; Becker (A), 08; Collins (E A), 06, 07; Cutler, 11; Hastings, 06a, b; Jennings (E P), 05a; Lincoln, 07a; Locke, 12; Ransome, 07, 07a, 09, 10a; Rice (C T), 11, 11b; Rickard, 08a; Shaw (E S), 11; Spurr, 07b; Taft, 06; Winchell (H V), 05  
 Hornsilver district: Ransome, 09a  
 Humboldt Co.: Ransome, 09d, e  
 in quartzites of eastern Nev.: Weeks, 02b  
 Jarbidge district: Schrader, 12; Sweetser, 10  
 Kennedy district: Klopstock, 13  
 Lida district: Root, 09  
 Lyon and Washoe cos.: Hill (J M), 11  
 Manhattan district: Emmons (W H), 07; Ferguson (H G), 17; Rice (C T), 06c  
 National district: Lindgren, 15; Winchell (A N), 12a  
 Nye Co., Golden Arrow district: Ferguson (H G), 16; Manhattan placers: Jones (C C), 09  
 Osceola district: Weeks, 08  
 Palmyra district: Cutler, 12  
 Pioche district: Abbott (J W), 07; Bell, (R N), 11; Pack, 06



## Nevada—Continued.

*Economic geology*—Continued.

Gold: Rawhide district: Gehrmann, 08; Del Mar, 08; Whytock, 09, 10  
 Round Mountain, Nye Co.: Loftus, 09; Packard (G A), 07; Ransome, 09b  
 Silver Peak quadrangle: Spurr, 06b  
 southwestern Nev.: Ball (S H), 06a, 07  
 Tonopah district: Jenney, 09c; Johnson (A T), 09; Rice (C T), 06, 06a, 11a, b; Spurr, 05; Taft, 06  
 Wonder district: Zalinski, 07b  
 Gold and silver at Fairview: Rice (C T), 06d  
 Gold tellurides: Sharwood, 07a  
 Gold-platinum-palladium lode, Clark Co.: Knopf, 15  
 Goldfield district: Cutler, 15; Dominican, 04; Draper, 04; Jennings (E P), 05a; Rickard, 15; Spurr, 04b, 05b  
 Goldfield type of ore occurrence: Hill (R T), 08b, c; Lewis (J V), 09a  
 Goodsprings district, Clark Co.: Nevius, 15  
 Gypsum, Lyon Co.: Read, 12; northwestern Nev.: Louderback, 03, 04  
 Hornsilver district: Ransome, 09a  
 Humboldt Co.: Ransome, 09d, e  
 Iron Amarilla district: Hershey, 08c  
 Barth deposit: Jones (J C), 13  
 Dayton: Harder, 10d  
 Jarbidge, Contact, and Elk Mountain mining districts: Schrader, 12  
 Jarbidge mining district: Buckley, 11b; Sweetser, 10  
 Kennedy mining district: Klopstock, 13  
 Kimberly camp, Battle Mountain region: Carpenter (J A), 10  
 Klondike district: Spurr, 06a  
 Lander mining district: Martin (A H), 10e  
 Lead, Clark Co., Yellow Pine district: Gregory (N B), 10a; Hill (J M), 13a  
 Eureka district: Blake, 79; Chance, 08; Curtis, 84; Ingalls (W R), 07b  
 Lida mining district: Root, 09  
 Lincoln Co., Bristol mine: Goodale, 10  
 Pioche: Abbott (J W), 07; Pack (F J), 06  
 White Pine district: Larsh, 09  
 Lone Mountain district, near Tonopah: Lakes, 04d  
 Lucky Boy mine, Esmeralda Co.: Wroth, 08  
 Lyon Co., oil prospecting: Anderson (R), 09b  
 Magnesite: Gale, 14f  
 Manganese: Harder, 10  
 Clark Co.: Hale (F A), 18a  
 Golconda: Penrose, 93  
 Manhattan district: Emmons (W H), 07; Ferguson (H G), 17; Jenney, 09b; Rice (C T), 06c; White Caps mine: Dynan, 16  
 Manhattan placers, Nye Co.: Jones (C C), 09a  
 Marble, White Pine Co.: Darton, 08a  
 Mason mining district, Lyon Co.: Zehring, 09  
 Mineral Hill district, Eureka Co.: Maynard, 15; Toll, 12  
 Mining developments: Selwyn-Brown, 08  
 Mining districts: Wheeler (G M), 72a, 74a  
 Montezuma district: Stretch, 04  
 National mining district: Lindgren, 11c, 15; Winchell (A N), 12a

## Nevada—Continued.

*Economic geology*—Continued.

Nevada-Douglas mines, Lyon Co.: Read, 12  
 Nickel: Newberry (S B), 84  
 Nitrate deposits: Gale, 12; Humboldt Co.: Van Wagenen, 02  
 Northwestern Nev.: Hill (J M), 15  
 Ore shoots: Chase (E E), 09  
 Osceola mining district, White Pine Co.: Weeks, 08  
 Petroleum: MacFarland, 09  
 Lyon Co., prospecting: Anderson (R), 09b  
 Phosphate, Amarilla district: Hershey, 08c  
 Pioche district, Lincoln Co.: Abbot (J W), 07; Bell (R N), 11; Maynard, 91; Pack (F J), 06; Half-Moon mine: Wiltsee, 93; Prince Consolidated mine: Zalinski, 13  
 Platinum, Boss mine, Yellow Pine district: Kennedy, 15  
 Clark Co.: Bancroft (H C), 10a  
 Goodsprings: Crampton, 16  
 Platinum-gold lode, Yellow Pine district: Knopf, 14d, 15c  
 Potash: Free, 12a  
 Railroad Valley: Free, 13  
 search for: Gale, 13a  
 Potash tests, Columbus Marsh: Gale, 14c  
 Prince Consolidated mines: Jessup, 13  
 Quartz veins of Silver Peak: Hastings, 06  
 Quicksilver: Blake, 78  
 Railroad Valley: Sheldon (G L), 12  
 Ramsey, Talapoosa, and White Horse districts, Lyon and Washoe cos.: Hill (J M), 11  
 Rawhide district, Esmeralda Co.: Del Mar, 08; Gehrmann, 08; Whytock, 09, 10; Wolcott, 09  
 Ray mining district: Turner, 08b  
 Reno region, oil prospecting: Anderson (R), 09a  
 Robinson mining district: Lawson, 06; Lindgren, 07a  
 Rochester district: Jones (J C), 13a; Schrader, 14c, 16b  
 Round Mountain, Nye Co.: Loftus, 09; Packard (G A), 07; Ransome, 09b  
 Salines, Silver Peak Marsh: Dole, 13  
 Santa Fe district: McCormick, 01  
 Shelbourne Range, White Pine Co.: Wiel, 04  
 Silver: Jackson, 65d  
 Antelope district: Schrader, 13  
 Austin: Taylor (H B), 12  
 Bullfrog district: Ransome, 10c  
 Comstock lode: Becker, 82a  
 desert mines: Everette, 08  
 Elko, Lander, and Eureka cos.: Emmons (W H), 10  
 Esmeralda Co., Klondike district: Spurr, 06a  
 Eureka district: Chance, 08; Curtis, 84; Ingalls (W R), 07b  
 Fairview district: Rice (C T), 06d; Zalinski, 07a  
 halogen salts, Wonder: Burgess, 17  
 Hornsilver district: Ransome, 09a  
 Humboldt Co.: Ransome, 09d, e  
 Lander district: Martin (A H), 10e  
 Lida district: Root, 09  
 Kennedy district: Klopstock, 13  
 Lincoln Co., Bristol mine: Goodale, 10



## Nevada—Continued.

*Economic geology—Continued.*

- Silver: Magdalena district: Haddon, 06  
 Mineral Hill district, Eureka Co.: Maynard, 15; Toll, 12  
 Palmyra district: Cutler, 12  
 Pioche district: Abbott (J W), 07; Bell (R N), 11; Durand, 73c; Pack, (F J), 06  
 Rawhide: Whytock, 10  
 Silver Peak quadrangle: Spurr, 06b  
 southwestern Nev.: Ball (S H), 06a, 07  
 Tonopah district: Burgess, 11; Eakle, 12; Jenney, 09c; Johnson (A T), 09  
 Ward camp: Plate, 07  
 Washoe mines: Blake (W P), 60  
 White Pine district: Clayton, 70a; Larsh, 09  
 Wonder district: Ritter, 09; Young (J W), 18; Zalinski, 07b  
 Yellow Pine district: Gregory (N B), 10a  
 Silver Peak quadrangle: Spurr, 04a, e, 06b  
 Silver Peak quartz veins: Hastings, 06  
 Southern Nev.: Taft, 05, 07  
 Southwestern Nev.: Ball (S H), 06a, 07  
 Steamboat Springs: Le Conte, 83; metallic sulphides: Lindgren, 03g; stibnite: Lindgren, 05f  
 Sulphur: Fulton (R L), 99  
 Rabbit Hole Springs: Adams (G I), 04b  
 Silver Peak quadrangle: Spurr, 06b  
 Tin, Lander Co.: Knopf, 16  
 Tonopah district: Balliet, 14; Burgess, 09, 11; Easton, 02; Jenney, 09c; Johnson (A T), 09; Knapp, 01; Locke, 11; Rice (C T), 06, 06a, 11a, b; Spurr, 03a, b, e, 05, 05c, e, 11, 15a; Taft, 06; Anon, 16; genesis: Bastin, 18  
 Tungsten, eastern Nev.: Weeks, 01, 03  
 Osceola: Smith (F D), 02  
 White Pine Co.: Weeks, 08b  
 Ward camp: Plate, 07  
 Washoe district: Becker, 82, 82a; Blake, 64  
 King (C), 70  
 Wedekind ore deposits: Wendeborn, 04; hydrothermal activity: Morris (H G), 03  
 Western Nev.: Conkling, 78; Spurr, 05d  
 White Pine district: Hague (A), 70; Larsh, 09  
 Wonder district: Ritter, 09; Zalinski, 07b  
 Wood tin, northern Nev.: Knopf, 16a  
 Yellow Pine district, Clark Co.: Gregory (N B), 10a; Hale (F A), 18; Hill (J M), 14a; Palmer (L A), 16b  
 Yerington copper district: Carpenter, 10a; Durand (C S), 10; Jennings, 07, 08, 09; Knopf, 18a; Ransome, 09c  
 Yerington-Buckskin district: Goodale, 11  
 Zinc, Pioche: Abbott (J W), 07  
 southern Nev.: White (Doug.), 09  
 Spring Mountains: Bain, 06b  
 Yellow Pine district: Gregory (N B), 10a; Hill (J M), 13a, 14a; Palmer (L A), 16b

*Historical geology.*

- Amyzon beds: Cope, 79j  
 Antelope district: Schrader, 13  
 Arabia district: Knopf, 18b  
 Big Smoky Valley: Meinzer, 17  
 Bullfrog district: Ransome, 10c  
 Cambrian: Walcott, 08a, 17

## Nevada—Continued.

*Historical geology—Continued.*

- Cedar Mountain region: Merriam, 16  
 Cedar Range, Nye Co.: Stevens (G R), 17  
 Clayton Valley: Meinzer, 17  
 Contact quaquaversal: Purington, 03  
 Eastern Nev.: Hill (J M), 16; Paleozoic: Hershey, 12b  
 Egan Canyon district: Emmons (S F), 70  
 Elko Co.: Schrader, 12  
 Elko, Lander, and Eureka cos.: Emmons (W H), 10  
 Ely district: Spencer (A C), 17  
 Esmeralda Co.: Turner, 02  
 Esmeralda formation: Turner, 00, 00d  
 Eureka district: Curtis, 84, 84b; Hague (A), 83, 85a, 92; Keyes (W S), 79  
 General: Engelmann, 76; Guillemin-Tarayre, 71; Hague (A), 77; Howell (E E), 75; King (C), 78a; Louderback, 01; Meek, 60a; Spurr, 03; Wheeler (G M), 72; Whitney, 66c  
 Fairview district: Greenan, 14  
 Gold-bearing quartzites, eastern Nev.: Weeks, 02b  
 Goldfield district: Hastings, 06a, b; Jennings (E P), 05a; Ransome, 09, 10a  
 Great Basin region: Turner, 01a  
 Humboldt region: Louderback, 04a  
 Igneous rocks of post-Jurassic age: Ball (S H), 08a  
 Jarbidge, Contact, and Elk Mountain mining districts: Schrader, 12  
 Jurassic, Hyatt, 94a  
 Manhattan district: Ferguson (H G), 17  
 Montezuma district: Stretch, 04  
 National district: Lindgren, 15  
 Northwestern Nev.: Hill (J M), 15  
 Ordovician: Whitney, 67c  
 Osino fish beds: Cope, 72u  
 Puebla Range, Humboldt Co.: Blake (J), 73c  
 Reese River basin: Waring (G A), 18  
 Rochester district: Schrader, 14c  
 Santa Fe district: McCormick, 01  
 Silurian: Whitney, 67c  
 Silver Peak district: Turner, 00g  
 Silver Peak quadrangle: Turner, 09  
 Stewart and Ione valleys: Buwalda, 14b  
 Tertiary mammal beds, Virgin Valley and Thousand Creek: Merriam, 10b, 11c  
 Tertiary river channel near Carson City: Reid (J A), 08d  
 Tonopah district: Burgess, 09; Spurr, 04f, 05, 11, 15a; Anon, 16  
 Toyabe Range: Emmons (S F), 70  
 Triassic: Smith (J P), 04a, 07  
 Truckee region east of the Sierra Nevada: Louderback, 08  
 Walker River region: Smith (D T), 03, 04  
 Washoe district: Becker, 82a; Blake (W P), 64; King (C), 70  
 Western Nev.: Conkling, 78  
 White Pine district: Clayton, 70a; Hague (A), 70  
 Yellow Pine district, Clarke Co.: Hale (F A), 18  
 Yerington district: Knopf, 18a

*Mineralogy.*

- Albitite dikes: Ransome, 11d



## Nevada—Continued.

*Mineralogy*—Continued.

- Bismite: Schaller, 10g  
 Bullfrog district: Ransome, 10c  
 Covellite, Yerington and Ruth: Rogers (A F), 11  
 Dahllite, Toponah: Rogers (A F), 12d  
 Ely district: Spencer (A C), 17  
 Erythrite: Blake (W P), 85b  
 Famatimite, Goldfield: Shannon (E V), 17a  
 Gaylussite: Blake (J M), 66; Silliman (jr), 66a  
 General: Conkling, 78a; Hoffmann, 78; Stretch, 67  
 Goldfield district: Ransome, 09  
 Gypsum and anhydrite, Ludwig mine, Lyon Co.: Jones (J C), 12a; Rogers (A F), 12c 13e  
 Humboldt Co.: Ransome, 09d  
 Hydrozincite, Lincoln Co.: Ford (W E), 16  
 Iodyrite, Toponah: Kraus, 09, 13a  
 Jarosite: Hillebrand, 02  
 Leadhillite: Palache, 09a  
 Meteorite: Jenney, 09, 09a  
 Quinn Canyon: Farrington, 02  
 Miloschite, Ely: Wherry, 16h  
 Minerals: Silliman (jr), 73b  
 Natrojarosite: Hillebrand, 02  
 Nickel and cobalt, Esmeralda Co.: Hodges, 85  
 Opal: Kunz, 12  
 Orthoclase-bearing veins from Rawhide: Rogers (A F), 11c  
 Plumbojarosite, Yellow Pine district: Knopf, 15b  
 Powellite: Schaller, 08  
 Rochester district: Schrader, 14c  
 Silver, halogen salts, Wonder: Burgess, 17  
 Steamboat Springs: Jones (J C), 14b  
 Stetefeldtite: Riotte, 67  
 Stibnite, Steamboat Springs: Jones (J C), 12  
 Lindgren, 05f  
 Thinolite, Lake Lahontan: Dana (E S), 84  
 Tonopah minerals: Burgess, 11; Eakle, 12  
 Triplite, eastern Nev.: Hess, 13d  
 Vashegyite, Manhattan: Wherry, 16e  
 Wurtzite, Goldfield: Ransome, 14a

*Paleontology*.

- Aplodont rodent from Tertiary: Furlong, 10  
 Biped tracks: Cope, 83q  
 Cambrian fauna: Whitney, 72  
 Cambrian fossils, Pioche Mountains: Pack, 06a  
 Carnivora, Tertiary, John Day region: Merriam, 06b  
 Cestraciant teeth, Triassic: Wemple, 06  
 Check list of Carboniferous, Triassic, Jurassic and Cretaceous fossils: Gabb, 65  
 Devonian: Meek, 60c, 70e  
 Edestus: Dean, 97a  
 Ethmophyllum, Silurian: Meek, 68b  
 Eureka district: Walcott, 84, 92; Whitney, 72a  
 Footprints, Carson City: Blake (W P), 84c  
 Cope, 83zd; Davidson (G), 83; Le Conte, 82, 83c; Louderback, 07a; Rath, 84c; Stock, 17b  
 Fresh-water shells, Carboniferous: Walcott, 83f  
 Hipparion group: Merriam, 15c  
 Human footprints, supposed: Marsh, 83b  
 Ichthyosaur, Triassic: Merriam (J C), 05

## Nevada—Continued.

*Paleontology*—Continued.

- Ichthyosaurian from middle Triassic: Merriam, 10  
 Ichthyopterygia, Triassic: Merriam, 02  
 Invertebrata: Meek, 76e; White (C A), 74  
 Leuciscus, Miocene, Esmeralda Co.: Lucas (F A), 00c  
 Mammal-bearing beds of middle Tertiary Age: Merriam (J C), 07a  
 Mammalia, Pleistocene, Astor Pass: Merriam (J C), 15f  
 Tertiary: Merriam (J C), 14  
 Virgin Valley: Gidley, 08a  
 Mesozoic Mollusca: Gabb, 69a  
 Mustelid, Thousand Creek Pliocene: Butterworth, 16  
 Omphalosaurus: Merriam (J C), 11d  
 Pisces, Osino: Cope, 73v; Silver Peak district: Blake (W P), 67f  
 Pliocene faunas: Merriam (J C), 17a  
 Primordial fauna: Whitney, 72  
 Proboscidean tooth, Truckee beds: Buwalda, 14a  
 Reptile, marine, Triassic: Merriam (J C), 06c  
 Reptilia: Leidy, 68b  
 Rodent fauna, Tertiary beds, Virgin Valley and Thousand Creek: Kellogg, 10  
 Stickleback fish: Hay (O P), 07a; Jordan, 08  
 Strepsicerine antelopes: Merriam (J C), 09a  
 Tephrocyon: Merriam (J C), 13c  
 Tertiary freshwater Mollusca: Hannibal, 12  
 Tertiary Vertebrata, Cedar Mountain: Merriam (J C), 16  
 Triassic: Smith (J P), 04a, 14  
 Vertebrate faunas of Virgin Valley and Thousand Creek: Merriam (J C), 11c  
 Woods, fossil: Platen, 08
- Petrology.*  
 Eureka district: Iddings, 92  
 General: Conkling, 78a  
 Goldfield district: Hastings, 06a; Ransome, 09  
 National mining district: Winchell (A N), 12a  
 Quartz muscovite rock, Belmont: Spurr, 00d  
 Robinson district: Lawson, 06  
 Sierra Nevada, Carson area: Reid (J A), 11  
 Silver Peak quadrangle: Spurr, 06b; Turner, 09  
 Virginia City: Rath, 88a  
 Walker River region: Smith (D T), 04  
 Washoe district: Becker, 82a, 87; Hague, 85  
 Yerington district: Knopf, 18a
- Physical geology.*  
 Basin Range faulting: Louderback, 15a  
 Detrital slopes: Blake (W P), 07  
 Dolerite, columnar, Black Rock: Blake, (J), 73  
 Earthquake, Pleasant Valley: Berry (S L), 16; Jones (J C), 15  
 Earthquake crevices: Reid (J T), 17  
 Fault scarps at Genoa: Lawson, 12b  
 Faulting, Berlin mine: Daggett, 07  
 Bullfrog district: Emmons (W H), 07b  
 Great Basin: Russell, 87  
 Robinson district: Lawson, 06  
 Sierra Nevada fault zone: Reid (J A), 06  
 Sandstone at State prison, origin: Smith (WST), 12a  
 Tonopah, faulting: Spurr, 04f  
 Tufas of Lake Lahontan, origin: Jones (J C), 15a



## Nevada—Continued.

*Physiographic geology.*

- Alluvial fans: Lawson, 13  
 Basin ranges, origin: Davis (W M), 03a, e;  
     structure: Spurr, 00e, 01a  
 Big Smoky Valley: Meinzer, 17  
 Central Nev.: McGee, 95b  
 Deserts: Chapman, 06  
 Dry lakes, southern Nev.: Jenney, 89a  
 Fault scarps at Genoa: Lawson, 12b  
 General: Gilbert, 75; Howell (E E), 75  
 Glaciation: Gilbert, 74c  
 Great Basin: Blake (J), 73a; Brewer (W H), 89  
 Humboldt region: Louderback, 04a  
 Intermont plains: Keyes, 08a  
 Lake Lahontan: Jones (J C), 14a, 15a; Russell,  
     83, 85; Snyder, 14; geologic history: Gale,  
     15; Jones (J C), 14a  
 Lake Tahoe region: Louderback, 11; Reid  
     (J A), 11  
 Lakes, present and extinct: Russell, 95a  
 Manhattan district: Ferguson (H G), 17  
 Pyramid Lake: Fairbanks, 01a  
 Southwestern Nev.: Mendenhall, 09a  
 Stewart and Ione valleys: Buwalda, 14b  
 Tonopah district: Spurr, 05  
 Truckee region: Louderback, 08  
 Walker River region: Smith (D T), 04
- Underground water.*  
 Alkali Spring Valley: Meinzer, 17  
 Big Smoky Valley: Meinzer, 15b, 17  
 Clayton Valley: Meinzer, 17  
 Reese River basin: Waring (G A), 18  
 Southeastern Nev.: Carpenter (E), 15  
 Southwestern Nev.: Mendenhall, 09a  
 Springs, southern Nev.: Lyle, 78  
 Steamboat Springs: Blake, 64
- Nevada City folio, Cal. (no. 29): Lindgren, 96  
 Névé line on glaciers: Reid (H F), 07  
 Nevis: Sapper, 03f  
 Newark group: Wherry, 10, 12e; age: Dewey 57;  
     Redfield (W C), 56  
 Newark rocks, N. J.: Lewis (J V), 07b, c  
 Newark series, Conn.: Schuchert, 08  
 Newark system: Hobbs, 01, 02; Russell, 89c, 91, 92  
     lack of glacial records: Russell, 91  
     lavas: Darton, 89a  
 New Jersey: Kimmel, 97a, b  
 Newberria: Hall, 91c  
 Newberry, J. S., biography: Britton (N L), 93;  
     Dawson (J W), 93b; Hollick, 95a; Kemp,  
     93a, b; Orton, 96; Stevenson, 93b; White  
     (C A), 06
- New Brunswick.
- Albert and Westmoreland cos.: Huntington, 83  
 Bathurst district: Young (G A), 10  
 Bibliography: Kain, 95  
 Charlotte Co.: Johnston (R A A), 06  
 Climate of Acadia in earliest times: Matthew  
     (G F), 93e  
 Forest fire: Matthew (G F), 00a  
 Geology and mineral resources: Ells, 08a  
 Moncton area: Wright (W J), 15  
 Northern N. B.: Bailey (L W), 90, 03  
 St. John River region: Robb, 41  
 Tobique and Nepisiquit rivers: Bailey (L W),  
     64a

## New Brunswick—Continued.

- Tobique Co.: Young (G A), 09a  
 Tobique district: Young (G A), 11  
 Tobique River Valley: Parks (W A), 06  
 Transcontinental Railway surveys: Johnston  
     (R A A), 06a
- Economic geology.*  
 Albert and Westmoreland cos.: Ells, 85a  
 Albert shale deposits: Ells, 03a  
 Albertite, Hillsboro, Albert Co.: Dawson  
     (J W), 53; Gesner, 52; Hitchcock (C H),  
     65; Leidy, 60a; Milner, 12; Rogers (W B),  
     60e; Rutherford, 98; Taylor (R C), 51  
 Antimony, York Co.: Kunz, 85c, 86i  
 Asphaltic coal: Jackson, 51b  
 Asphaltum: Jackson, 50d  
 Austin Brook iron district: Lindeman, 11a, 13  
 Bathurst district: Young, 11a  
 Bituminous shales: Ells, 09  
 Building and ornamental stones: Parks  
     (W A), 12  
 Building stone: Ells, 08a; Parks (W A), 14  
 Burnthill Brook area: Young (G A), 18  
 Carbonaceous and bituminous minerals: Ells,  
     08c  
 Charlotte Co.: Ells, 04f  
 Clay and shale deposits: Keele, 14; Ries, 10, 11  
 Coal: Bailey (L W), 66, 02; Brown (J F K), 17;  
     Denis, 12; Ells, 08a, c; Gesner, 42; Gray,  
     13, 17; Hitchcock (C H), 65; Poole, 02, 02b,  
     03; Robb, 50  
     Albert mine: Hayes (A A), 56a; Rogers  
     (W B), 60c  
     Dunsinane: Matthew (G F), 65b  
     formation: Dawson (J W), 66  
     Grand Lake field: Leckie, 96  
     Hillsboro: Jackson, 53a; Rogers (H D), 52  
 Copper: Ells, 04c, 08a; Grand Manan Island,  
     Bay of Fundy: Chapman (E J), 72  
 Galena, York Co.: Cairnes, 17b  
 General: Bailey (L W), 99, 02a, 05; Gesner, 39,  
     40, 41, 42, 43; Hind, 65  
 Gloucester: Henwood, 71b  
 Gold: Bailey (L W), 92; Shea, 67  
 Graphite: Ells, 04a, 08a  
 Gypsum deposits: Bailey (L W), 06, 12; Ells,  
     08a; Jennison, 11; Kramm, 12a  
     Albert Co.: Bailey (L W), 12  
     Hillsboro deposit: Kramm, 13  
 Iron: Ells, 08a; Hardman, 08; Lindeman, 07;  
     Young (G A), 10  
     Austin Brook district: Lindeman, 11a, 13  
     Bathurst: Young (G A), 09a, 11a  
     Carleton Co.: Ells, 76a  
 Limestone: Ells, 08a  
 Manganese: Brumell, 92a; Quaco: Whittle, 91  
 Marl: Ells, 02a  
 Mineral resources: Bailey (L W), 64, 76a, 98a, b  
 Molybdenum deposits: Walker (T L), 11, 11a  
 Moncton area: Wright (W J), 14a, 15  
 Natural gas, Moncton area: Young, 12  
 Nickel-copper ores: Dickson, 06  
 Northern and eastern N. B.: Ells, 83  
 Northern N. B.: Bailey (L W), 87; Ells, 81  
 Oil shales: Baskerville, 09; Ells, 09a, 10, 10a, b,  
     c, 11a



## New Brunswick—Continued.

*Economic geology*—Continued.

- Petroleum, Moncton area: Young, 12  
 Phosphate deposits: Matthew (G F), 09  
 Phosphatic nodules, Cambrian: Matthew (W D), 93  
 Road materials, St. John: Hayes (A O), 17  
 St. John area: Hayes (A O), 14  
 Shale: Ries, 11c  
 Southern N. B.: Bailey (L W), 72, 80; Ells, 79, 06a  
 Tin and topaz: Brock, 11  
 Tripolite, Fitzgerald Lake, St. John: Crosby, 01  
 Tungsten: Camsell, 17b; Burnthill Brook area: Cairnes, 17b; Young (G A), 18  
 Western N. B.: Bailey (L W), 86  
 Wolframite deposits: Walker (T L), 11b  
 York and Carleton cos.: Bailey (L W), 85a

*Historical geology*.

- Acadia, evolution: Matthew (G F), 08  
 Albert and Westmoreland cos.: Bailey (L W), 78; Ells, 85a, 03a, 11a  
 Albert shales: Bailey (L W), 78  
 Bathurst district: Young, 11a  
 Borings: Poole, 03; Newcastle Bridge, Queens Co.: Ells, 73  
 Burnthill Brook area: Young (G A), 18  
 Cambrian: Matthew (G F), 82, 88b, c, 95h, 14, 16  
   basal series: Matthew (G F), 88a, 90  
 Eel River: Bailey (L W), 01a  
 Kennebecasis Valley: Matthew (G F), 98  
 Lower: Walcott, 00a  
   new base for: Ells 08f  
 Carboniferous: Ami, 00k; Bailey (L W), 02; Dawson (J W), 66; Ells, 01c; Poole, 03; Stopes, 12  
   folding: Gilpin, 83  
   southern N. B.: Bailey (L W), 73  
 Carleton Co.: Ells, 76a  
 Chaleur Bay region: Henwood, 42a; sections: Logan, 46a  
 Charlotte Co.: Ells, 04f, 05a; Matthew (G F), 65a, 78  
 Chignecto Bay: Poole, 03b  
 Coal vein, Albert mine: Rogers (W B), 60c  
 Curries Mountain: Bailey (L W), 10a  
 Devonian: Ami, 00k; Matthew (G F), 12; Dalhousie: Clarke (J M), 09a  
 Devonian and lower Carboniferous: Wilson (W J), 09a  
 Eozoonallimestones, St. John: Matthew (G F), 92c  
 Etchiminian: Matthew (G F), 99g  
 Fern ledges, Lancaster: Hartt, 65a  
 General: Bailey (L W), 72a, 76, 81, 85, 86a, 90a, 97, 99, 02a, 05; Credner, 65; Dawson (J W), 55, 68c; Ells, 87; Gesner, 39, 40, 41, 42, 43; Hind, 65; Honeyman, 76; Jackson, 52c, 55c; Johnson (J F W), 50; Matthew (G F), 70, 97a  
 Geological correlations: Bailey (L W), 01a  
 Geological cycles in the maritime provinces: Matthew (G F), 08a  
 Gold-bearing rocks: Bailey (L W), 92  
 Grand Lake coal field: Leckie, 96  
 Grand Manan: Bailey (L W), 71  
 Hillsboro: Dawson (J W), 53; Jackson, 53a; gypsum deposit: Kramm, 13

## New Brunswick—Continued.

*Historical geology*—Continued.

- Kennebecasis Valley: Matthew (G F), 98a  
 Lacustrine formation, Torryburn Valley: Matthew (G F), 83b  
 Laurentian and Huronian: Hind, 70d  
 Laurentian limestones, St. John: Am G, 92  
 Lepreau Basin: Matthew (G F), 95e  
 Little River group: Matthew (G F), 95; age: Matthew (G F), 10a  
 Lower Carboniferous: Rogers (W B), 59d  
 Marine clays, Gloucester Co.: Paisley, 73  
 Metamorphic and volcanic rocks: Ells, 06c  
 Metamorphic rocks, age: Matthew (G F), 70  
 Moncton area, Westmoreland and Albert cos.: Wright (W J), 14a; Young, 12  
 Newcastle Bridge, Queens Co.: Ells, 76  
 Northern and eastern N. B.: Ells, 83  
 Northern N. B.: Bailey (L W), 87, 89, 03; Ells, 81  
 Northumberland Strait: Ells, 94a  
 Northwestern N. B.: Bailey (L W), 88; Robb, 72  
 Ordovician, St. John: McLearn, 15b  
 Post-Pliocene, Bathurst: Paisley, 74  
 Pre-Cambrian: Hind, 70e  
 St. John area: Ami, 00; Dawson (J W), 80c; Hayes (A O), 14, 15a; Matthew (W D), 94a  
   effusive and dike rocks: Matthew (W D), 95a  
   fern ledges: Stopes, 14  
 St. John Co.: Matthew (G F), 63  
 St. John group: Matthew (G F), 85a, 93f; Dictyonema horizon: Matthew (G F), 91b  
 St. John plant beds, age: Matthew (G F), 01b  
 Sandstone, St. Croix, age: Agassiz (L), 61; Rogers (W B), 61c  
 Silurian: Bailey (L W), 87a  
 Southeastern N. B.: Matthew (G F), 65  
 Southern N. B.: Bailey (L W), 65, 72, 77, 79, 80; Ells, 79, 06a, 08, 12; Hunt, 74; Matthew (G F), 65c, 12a; Kingston Peninsula: Matthew (G F), 79  
 Tobique and Nepisiquit rivers: Bailey (L W), 64a  
 Tobique Valley: Stead, 93  
 Triassic: Powers, 15d, 16  
 Volcanic rocks: Bailey (L W), 05a; Matthew (W D), 95  
 Western N. B.: Bailey (L W), 86, 90b; Robb, 70  
 York and Carleton cos.: Bailey (L W), 85a  
 York Co., Cambrian and Silurian: Matthew (G F), 02
- Mineralogy*.  
 Albertite: Bailey (L W), 01; Honeyman, 86d; Wetherill, 53a  
 Antimony, York Co.: Kunz, 85c  
 Mineral localities: Marsh, 63  
 Topaz, crystal habit: Ellsworth (H V), 13
- Paleontology*.  
 Acadian fauna, age: Matthew, 84  
 Archæozoon: Matthew (G F), 07  
 Cambrian: Matthew (G F), 88b, 95h, 06b, 14, 16  
   basal series: Matthew (G F), 90  
 Brachiopoda, St. John: Matthew (G F), 95f  
 Kennebecasis Valley: Matthew (G F), 98  
 St. John: Hartt, 65; Matthew (G F), 92a



## New Brunswick—Continued.

*Paleontology*—Continued.

- Camerotheca (pteropod), St. John group: Matthew (G F), 85b  
 Carboniferous flora, St. John: Stopes, 14  
 Carboniferous flora in Silurian (?): White (D) 11a  
 Cetacean, fossil: Perkins (G H), 10  
 Cetacean bones, Jacquet River: Gilpin (J B), 74  
 Cirripedes, Cambrian: Matthew (G F), 96  
 Crustacea, Devonian: Salter, 63  
 Devonian, Dalhousie: Clarke (J M), 09a; southern N. B.: Matthew (G F), 89b  
 Devonian and Carboniferous fossils: Wilson (W J), 10a  
 Devonian Insecta: Dawson (J W), 90e; Hagen, 81; Scudder, 65, 65a, 67a, 80  
 Devonian plants, St. John: Dawson (J W), 62a, 81c; Matthew (G F), 06a, 07a  
 Devonian fossils: Clarke (J M), 07a  
 Dictyonema fauna, Navy Island: Hahn (F F), 12a  
 Diplaspis, Silurian: Matthew (G F), 87d  
 Discina acadica, St. John group: Matthew (G F), 86a  
 Entomostraca: Jones (T R), 89a  
 Eozoon, St. John: Matthew (G F), 90b  
 Fern ledges, Lancaster: Hartt, 65a; St. John: Stopes, 13  
 Fish fauna of Albert shales: Lambe, 09, 10a  
 Fossils in metamorphic rocks: Ellis, 12  
 General: Dawson (J W), 55; Jackson, 51c  
 Geracus, Little River group, St. John Co.: Matthew (G F), 97b  
 Graptolites, St. John: Matthew (G F), 95i  
 Hyolithes, St. John group: Matthew (G F), 01a  
 Insecta, Paleozoic: Dawson (J W), 67b  
 Kennebecasis Valley: Matthew (G F), 98a  
 Lepidophloios: Dawson (J W), 97a  
 Lepidostrobus: Wilson (W J), 13a  
 Leptoplastus, Cambrian: Matthew (G F), 89a  
 List of fossils: Ami, 05b; Hartt, 65b  
 Little River group: Matthew (G F), 95, 95a, c, 97b, 10c; flora: Matthew (G F), 06, 10b, 11  
 Mollusca, post-Pliocene: Matthew (G F), 74  
 Niagara coral reefs: Honeyman, 74b  
 Oldhamia, Caton's Island: Matthew (G F), 00b  
 Ordovician, St. John: McLearn, 15b  
 Palaconiscus, Hillsboro: Egerton, 53  
 Paradoxides, St. John: Matthew (G F), 87e  
 Paradoxides beds faunas: Matthew (G F), 93a  
 Pecopteris, St. John: Dawson (J W), 81g  
 Pisces, Carboniferous: Dawson (J W), 77d; Jackson, 51e, 52a  
 Devonian, Scaumenac Bay and Campbelltown: Traquair, 90; Whiteaves, 81d, 89c; Woodward (A S), 89, 92a  
 Plantae: Holden (R), 13a; Wilson (W J), 18; Hillsboro: Jackson, 52a  
 Pre-Carboniferous flora: Dawson (J W), 61c  
 Protolenus, St. John group: Matthew (G F), 92b  
 Psammichnites and trilobites: Matthew (G F), 88c  
 Pteraspis, Silurian: Matthew (G F), 86b, 87a

## New Brunswick—Continued.

*Paleontology*—Continued.

- St. John group: Matthew (G F), 83, 85, 85a, 86 86c, 87b, c, 88, 91, 92, 93a, b, 94; Walcott, 84, 85; Paradoxides beds: Matthew (G F), 97  
 Sigillaria, South Joggins: Jackson, 51c  
 Silurian, southern N. B.: Matthew (G F), 89b  
 Silurian and Devonian plants: Matthew (G F), 07a  
 Silurian fish: Matthew (G F), 07  
 Silurian flora: Matthew (G F), 10d, 12a  
 Siphonotreta (Protosiphon), St. John group: Matthew (G F), 97d  
 Southern area: Wilson (W J), 11  
 Sphaerolites, Dalhousie: Hinde, 75  
 Sponges, St. John: Matthew (G F), 90c  
 Stenotheca, St. John: Matthew (G F), 85e  
 Stigmara, South Joggins: Jackson, 51c  
 Trap, fossils in: Honeyman, 74b  
 Trematobolus: Matthew (G F), 93c  
 Whale, Quaternary: Honeyman, 74a, b

*Petrology*.

- St. John, intrusive rocks: Matthew (W D), 94; effusive and dike rocks: Matthew (W D), 95a, 97  
 Volcanic rocks: Bailey (L W), 05a

*Physical geology*.

- Carboniferous, folding: Gilpin, 83  
 Caves: Bailey (L W), 04  
 Coast, changes of level: Gesner, 61a; postglacial: Goldthwait, 12  
 Coastal subsidence: Goldthwait, 14a  
 Earthquakes: Kain, 98, 04  
 Erosion, coast ice and floating ice, Chaleur Bay: Chalmers, 83  
 Faulting, St. John: Matthew (G F), 94c  
 Folding in gypsum layers: Andrée, 14  
 Geological contacts: Bailey (L W), 85  
 Oliver's cave: Matthew (G F), 04  
 Peat bogs: Ganong, 97  
 Postglacial faults, St. John: Matthew (G F), 94b  
 Quaco, shore line: Whittle, 91a  
 Strain in rock: Stead, 06  
 Tidal erosion, Bay of Fundy: Matthew (G F), 80

*Physiographic geology*.

- Bay of Fundy coast in glacial period: Chalmers, 93a  
 Boulder clay deposits, Bay of Fundy: Chalmers, 93a  
 Chignecto Isthmus: Monro, 86  
 Coast in glacial period: Chalmers, 93a  
 French Lake: Matthew (G F), 95d  
 General: Bailey (L W), 10; Daly (R A), 01; Ganong, 96; Goldthwait, 13a; Hind, 65  
 Glaciation, Chaleur Bay region: Chalmers, 81, 82  
 Grand Manan: Bailey (L W), 71  
 Lepreau Basin: Matthew (G F), 95e  
 Northern N. B.: Bailey (L W), 03a  
 St. John River, history: Bailey (L W), 83; outlets: Matthew (G F), 94d  
 Striae: Robb, 51  
 Surface geology: Chalmers, 85a, 95a, 99a; 00a: Matthew (G F), 72; Stead, 03



## New Brunswick—Continued.

*Physiographic geology*—Continued.

- Surface geology; central and eastern N. B.:  
 Chalmers, 93  
 eastern N. B.: Chalmers, 91, 92, 95  
 Fredericton: Reed (W T L), 85  
 Fredericton and Andover sheets: Chalmers, 02  
 northeastern N. B.: Chalmers, 88  
 northern N. B.: Chalmers, 87, 87a  
 northwestern N. B.: Chalmers, 01  
 southeastern N. B.: Chalmers, 94  
 southern N. B.: Chalmers, 89, 90, 90a; Matthew (G F), 79a  
 western N. B.: Chalmers, 85  
 Tobique Valley: Stead, 93

*Underground water.*

- Artesian wells: Matthew (G F), 99d

Newburg district, Mo.: Lee (W), 11

Newburyport area, Mass.: Clapp (C H), 09a

Newcastle folio, Wyo. (no. 107): Darton, 04

## New England.

- General: Bartlett, 77

*Historical geology.*

- General: Hunt, 70c

*Mineralogy.*

- General: Bartlett, 77

*Physiographic geology.*

- Glaciation: Upham, 89

- Peneplain: Lobeck, 17

- Southern New England, physiography: Davis (W M), 95

## Newfoundland.

- Bay D'Espoir—Exploits River: Howley, 89

- Conception Bay, north shore: Howley, 79

- Economic value of survey: Murray, 69

- Exploits River region: Murray, 76

- General: Bonnycastle, 42; Cormack, 24; Hatton, 83; Howley, 17; Jukes, 42; Murray, 77, 78, 79, 80

- Geology and mineral resources: Gratacap, 05; Howley, 09a

- Goose Brook district: Howley, 17b

- Grand Lake district: Howley, 17a

- Humber Valley: Howley, 93

- Northwestern coast: Howley, 17b

- Notre Dame Bay: Howley, 79a

- Survey, progress, 1840: Jukes, 40; report: Jukes 39

*Economic geology.*

- Asbestos, Port au Port: Willis (C E), 94

- Avalon Peninsula: Howley, 82

- Bay of Notre Dame region: Murray, 72

- Bay of St. George region: Howley, 90

- Chromite, Port au Port Bay: Maynard, 98

- Coal: Howley, 09b, 13, 17b, e, 18b; McGrath, 16a

- Bay of St. George region: Howley, 90, 17d; Murray, 73a

- Codroy River: Howley, 17c

- Goose Brook: Howley, 18, 18a

- Grand Lake: Howley, 05

- Humber Valley: Howley, 93

- Western Newfoundland: Gilpin, 74

- Copper: Symons, 10

- Notre Dame Bay: Wadsworth, 84c

- Tilt Cove: Garland, 88; Marett, 72

- General: Howley, 99; Jukes, 43; Murray, 70a, 81, 81c

## Newfoundland—Continued.

*Economic geology*—Continued.

- Gold: Symons, 10

- Brigus: Murray, 81b

- Conception Bay: Murray, 81a

- White Bay: Howley, 03a

- Iron ores: Chambers, 09; Howley, 10, 18a; McDonald (P B), 15; Outerbridge, 09a

- Bell Island: Chambers (R E), 96

- Wabana mines: Cantley, 11; Hayes (A O), 14a, 15; McGrath, 16; Symons, 11; origin: Hayes (A O), 16

- Manganese, Conception and Trinity bays: Dale (N C), 15

- Mineral resources: Howley, 99, 00, 01, 02, 03, 04, 05, 06, 07, 09, 09a, 10a, 18a; Murray, 67a; Outerbridge, 09a; Scott (W), 00; Symons, 09, 10

- Nickel, Tilt Cove: Marett, 72

- Notre Dame Bay: Murray, 76

- Oil shales: Ells, 09a, 10a

- Port au Port and St. George bays: Howley, 75

- Pyrites, Port au Port: Meissner, 02

- St. George's Bay region: Murray, 73a

- Southeastern Newfoundland: Murray, 68a

- Southwestern Newfoundland: Murray, 67

- Tilt Cove region: Murray, 68

- Wabana submarine slopes: Chambers, 09

*Historical geology.*

- Algonkian, southeastern Newfoundland: Buddington, 14

- Avalon Peninsula: Howley, 82; geologic map: Murray, 82

- Bay D'Espoir—Exploits River: Howley, 89

- Bay East River region: Murray, 70a

- Bay of Notre Dame region: Murray, 72

- Bay of St. George region: Howley, 90

- Boring, Grand Pond: Murray, 80

- Cambrian: Matthew (G F), 88b, 14; basal series: Matthew (G F), 88a

- Cambrian, Lower: Walcott, 00a

- Cambrian and Ordovician, southeastern Newfoundland: Van Ingen, 14; table: Van Ingen, 14a

- Carboniferous: Murray, 80

- Humber Valley: Howley, 93

- St. George's Bay: Gilpin, 74a

- Western coast: Murray, 68a

- Western Newfoundland: Gilpin, 74

- Conception and Trinity bays: Dale (N C), 15

- Conception Bay: Buddington, 16

- Eastern Newfoundland: Murray, 70

- Etchiminian: Matthew (G F), 99g

- Gander and Gambo rivers: Howley, 77

- Gander River country: Murray, 75

- General: Ami, 00a; Hyatt, 85; Jukes, 39, 40, 43; Milne, 77; Murray, 66, 67a, 68, 70a, 79a, 81; Perley, 62; Symons, 10; Weston, 96a

- Geologic map: Can G S, 13a; Howley, 07a

- Humber Valley: Howley, 06, 07

- Laurentian: Adams (F D), 93

- Manuel's Brook: Walcott, 89c

- Notre Dame Bay: Murray, 76; Wadsworth, 84c

- Port au Port and St. George bays: Howley, 75

- Random terrane: Walcott, 00

- St. George's Bay region: Murray, 73a

- St. John's: Baird, 22



## Newfoundland—Continued.

*Historical geology*—Continued.

- Southeastern Newfoundland: Murray, 68a  
 Southwestern Newfoundland: Murray, 67  
 Taconic, eastern Newfoundland: Howley, 89a  
 Terra Nova River: Murray, 70  
 Tertiary, Grand Bank: Verrill, 78  
 Tilt Cove region: Murray, 68  
 Trinity Bay region: Murray, 73  
 Wabana iron region: Hayes (A O), 15, 16  
 White Bay: Howley, 03a

*Mineralogy*.

- List of minerals: Howley, 80  
 Mineral localities: Marsh, 63

*Paleontology*.

- Avalon Peninsula: Billings, 82  
 Cambrian: Billings, 72f, 74; Matthew (G F), 87, 99a  
 Cambrian and Ordovician, southeastern Newfoundland: Van Ingen, 14  
 Carboniferous: Dawson (J W), 83c; plants: Dawson (J W), 91  
 Cirripedes, Cambrian: Matthew (G F), 96  
 Etcheminian fauna: Matthew (G F), 99e; Smith Sound: Matthew (G F), 99b  
 General: Hyatt, 85  
 Lepidophloios cliftonensis: Dawson (J W), 98  
 Metadoxides, Cambrian: Matthew (G F), 99c  
 Ordovician: Billings, 65  
 Paradoxides, St. Mary's Bay: Jackson, 59g  
 Paradoxides beds faunas: Matthew (G F), 96a  
 Primordial: Whiteaves, 78b  
 Psymphyllum majus: Arber, 10, 12  
 Trilobita: Salter, 59a

*Petrology*.

- Conception Bay: Buddington, 16  
 Notre Dame Bay: Wadsworth, 84c  
 Variolitic pillow-lava: Daly (R A), 03c

*Physical geology*.

- Coast subsidence: Perley, 50  
 Conception Bay, metamorphism: Buddington, 16

Ice work: Milne, 76

*Physiographic geology*.

- General: Perley, 62; Twenhofel, 12  
 Glacial striae: Kerr, 70  
 Glaciation: Chamberlin (T C), 95b; Murray, 83; Packard (A S), 76b; Wright (G F), 95

## New Hampshire.

- Boulder, Madison: Crosby, 90b  
 General: Bouvé, 45; Hitchcock (C H), 77g; Jackson, 45  
 Isles of Shoals: Hovey (H C), 95, 95a  
 Physical history: Hitchcock (C H), 77a  
 Survey report: Hitchcock (C H), 71, 72, 73; Jackson, 41, 42  
 Surveys: Hitchcock (C H), 74, 96  
 West River Mountain, Chester Co.: Alexander (C), 85; Jones (D), 85  
 White Mountains: Dawson (J W), 62b; Johnson (W R), 44

*Economic geology*.

- Ammonoosuc gold fields: Hitchcock (C H), 79  
 Beryl, Grafton: Jackson, 56d  
 Building stone: Hawes, 84  
 Cement materials: Eckel, 13

## New Hampshire—Continued.

*Economic geology*—Continued.

- Copper deposits: Emmons (W H), 09, 10a; Jackson, 43a, 46c; Weed, 11  
 General: Hitchcock (C H), 69, 70, 78d; Jackson, 41, 43d, 44  
 Gold: Hitchcock (C H), 69; Ammonoosuc field: Hitchcock, 78f  
 Granites: Dale, 08a, 10; Villarello, 09a  
 Iron, Bartlett: Huntington, 80  
 Lead: Jackson, 43a; Shelburne: Hodge (J T), 53; Jackson, 53f; Richardson (C S), 54g  
 Mica: Shaler, 86b; Grafton: Pulsifer, 14  
 Milan mine: Emmons (W H), 10a  
 Northern N. H.: Verrill, 66  
 Silver: Emmons (W H), 10a; Shelburne: Richardson (C S), 54g  
 Tin, Jackson: Jackson, 43  
 Zinc: Emmons (W H), 10a; Jackson, 43a; Warren: Jackson, 46c

*Historical geology*.

- Ammonoosuc district: Hitchcock (C H), 78f, 04a; Lahee, 16a  
 Belknap Mountains: Pirsson, 05b  
 Charlestown: Webber, 42  
 Cheshire Co.: Tenney, 78  
 Concord-Wakefield Haverhill section: Whitney, 41a  
 Connecticut Valley: Smith (A), 32  
 Coos and Essex district: Huntington, 77  
 General: Hitchcock (C H), 70, 71, 73b, c, 77, 77g, 78c, 79a, 84a, 85; Jackson, 41, 44  
 Geologic history: Hitchcock (C H), 75  
 Geologic map: Hitchcock (C H), 77g, 78e  
 Green Mountain gneiss: Hitchcock (C H), 84c  
 Hanover district: Hitchcock (C H), 08; Merritt, 13  
 Hanover quadrangle: Hitchcock (C H), 08  
 Helderberg rocks: Hitchcock (C H), 74d, 77e  
 Isles of Shoals: Rand, 92a  
 Littleton area: Hitchcock (C H), 05; Lahee, 13  
 Blueberry Mountain: Lahee, 12b  
 Lyman schists, origin: Lahee, 16a  
 Merrimac district: Huntington, 77  
 Merrimac Valley, surface geology: Upham, 77b  
 Mount Kearsarge: Perry (J H), 03a  
 Mount Monadnock: Perry (J H), 04; striae: Wheelock, 73  
 Norian rocks: Hitchcock (C H), 72a  
 Northern N. H.: Verrill, 66; Whitney, 41a  
 Paleozoic, Connecticut Valley: Hitchcock (C H), 96a  
 Pequawket Mountain, metamorphic rocks: Jackson, 43b  
 Physical history: Hitchcock (C H), 77a  
 Portsmouth-Claremont section: Whitney, 41  
 Sections crossing N. H.: Hitchcock (C H), 84  
 Silurian, Littleton: Dale, 86  
 Slate area, Nashua: Tilton, 96a  
 Southeastern N. H.: Katz, 17a  
 Southern N. H.: Hitchcock (C H), 73  
 Tripyramid Mountain, geology: Pirsson, 11  
 White Mountains: Hitchcock (C H), 70c, 71, 72, 73d, 77d; Hubbard (O P), 38; Jackson, 46d; Rogers (H D), 46; True (N T), 81; age: Lesley, 60a; eruptive rocks: Hitchcock (C H), 94



## New Hampshire—Continued.

*Historical geology*—Continued.

Winnepesaukee Lake, geologic history: Hitchcock (C H), 74e

*Mineralogy*.

Beryl, Acworth: Holden, 18; Teschemacher, 44a; Grafton: Alger, 56; Hubbard (O P), 52

Charlestown: Webber, 42

Danalite, Bartlett: Wadsworth, 80a

General: Hawes, 78; Jackson, 41

Graftonite, Grafton: Penfield, 00

Iolite: Shepard, 41a

Mineral localities, catalog: Hawes, 75

Rutilated quartz: Hubbard, 50a

Triphylite, Grafton: Penfield, 77

Uranium, Acworth: Teschemacher, 45a

Warren: Bouvé, 67

*Paleontology*.

Ammonoosuc district: Hitchcock (C H), 04a

Dalmanites, Littleton: Lambert, 04, 05

Diatoms: Edwards (A M), 60

Helderberg corals, Littleton: Hitchcock (C H), 71b

Littleton area: Hitchcock (C H), 72b; Lahee, 13; Pumpelly, 88; Blueberry Mountain fossils: Lahee, 12b

Organic remains in greenstones: Hawes, 76b

White Mountains: Rogers (H D), 48

*Petrology*.

Albany granite: Hawes, 81

Belknap Mountains: Pirsson, 05b, 06b

Catalog of rocks: Hitchcock (C H), 70b

Dolerites, iron in: Hawes, 77

Eruptive rocks, Campton: Hawes, 79

General: Hawes, 78

Greenstones: Hawes, 76b

Hanover, schist, sedimentary origin: Merritt, 14

Hornblende schist, origin: Hitchcock (C H), 90c

Hornblende syenite, Red Hill: Bayley, 92

Labradorite rocks, Waterville: Dana (E S), 72

Lake Winnepesaukee: Washington, 00d

Lyman schists, origin: Lahee, 16a

Monadnock Mountain: Perry (J H), 04

Mount Kearsarge: Perry (J H), 03a

Ossipyte, Waterville: Dana (E S), 72

"Porphyritic gneiss": Daly (R A), 97

Quartz porphyry, Pequawket Mountain: Daly (R A), 96

Red Hill: Pirsson, 07

Thetford limburgite boulders: Richardson (C H), 97

Tripyramid Mountain, petrography: Pirsson, 11, 11a

White Mountains: Hitchcock (C H), 72

*Physical geology*.

Earthquakes: Alden (T jr), 04

Erosion of trap rocks: Hubbard (O P), 50

Glacial erosion, White Mountains: Emerson (P), 00

Landslide, Mount Lafayette: Hitchcock (E), 52

Passaconaway: Perkins (G H), 70

White Mountains: Hitchcock (C H), 85b, c

Lost River: Goldthwait, 15b

Northey Hill in Lisbon: Lahee, 12

Potholes, Orange: Jackson, 50g

Stratification in homogeneous rocks: Hitchcock (C H), 97b

## New Hampshire—Continued.

*Physiographic geology*.

Androscoggin Glacier: Stone (G H), 80a

Bethlehem moraine: Goldthwait, 16

Coast: Shaler, 75

Connecticut Valley, glacial deposits: Dana (J D), 81a

glacial period: Upham, 77

glacial retreat: Dana (J D), 82

interglacial deposits: Hitchcock (C H), 00b

near Hanover: Goldthwait, 10b

Connecticut Valley glacier: Hitchcock (C H), 92

Coos Co.: Huntington, 74, 78

Drift, glacial: Hitchcock (C H), 78a; modified: Upham, 78

Drumlins: Hitchcock (C H), 77b

General: Hitchcock (C H), 74c; Jackson, 45

Glacial cirques near Mount Washington: Goldthwait, 13

Glacial period, complexity in northeastern New England: Clapp (F G), 08

Glacial stages: Clapp (F G), 06a

Glacial topography, central N. H.: Emerson (P), 04

Glaciation: Atherton, 95, 97; Hitchcock (C H), 83a; Upham, 89; Coos Co.: Huntington, 78

Gulf of Maine: Lindenkohl, 83

Littleton: Hitchcock (C H), 05

Lost River: Goldthwait, 15b; history: Sayles, 13

Merrimac Valley, surface geology: Upham, 77b

Moraines: Hitchcock, 92a; Jackson: Foshay, 14

Mount Kearsarge, glaciation: Putnam, 85

New England peneplain in White Mountain region: Goldthwait, 15c; Lobeck, 16, 17

Newington moraine: Katz, 17

Pleistocene shore lines: Katz, 18, 18a

Snow arch, Tuckermans Ravine, Mount Washington: Goldthwait, 17a

Surface geology: Upham, 77c

Till: Upham, 79c

Tillite, Sugar Hill: Sayles, 15

White Mountains: Hitchcock (C H), 71; Johnson (D W), 16b

glaciation: Agassiz (L), 70; Goldthwait, 16;

Guyot, 50; Hitchcock (C H), 76, 78g, 93;

Packard (A S), 67, 67a; Vose, 68, 68a

local glaciation, date: Johnson (D W), 17

moraines and eskers: Upham, 04

Presidential Range: Goldthwait, 13a; graded upland: Goldthwait, 14

terraces: Spencer (J W), 08b

*Underground water*.

General: Boutwell, 04; Fuller, 05f

Portsmouth-York region: Smith (G O), 05c

## New Jersey.

Amber, Cretaceous, Gloucester Co.: Kunz, 83a; Trenton: Abbott (C C), 83

Bibliography: Black, 16

Cape May Co.: Cook (G H), 57a

Centennial exhibit, catalog: Cook (G H), 76a

Flint nodule from green sand: Leidy, 83b

Franklinite vein, magnetism: Farrington, 52

General: Kitchell, 55, 56; Rogers (H D), 36, 40a; Wurtz, 55

Geology, influence on forestry: Hollick, 99b

Greensand, origin: Rogers (H D), 50

Highlands: Pierce, 22



## New Jersey—Continued.

- Northern N. J.: Kitchell, 56a; Pierce, 20  
 Palisades: Hoppock, 82; Kümmel, 01c  
 Passaic Falls, Paterson, geologic history: Nelson, 92  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 Schooley Mountain: Mitchill, 14a  
 Soils: Cook (G H), 78, 79; Salisbury, 99  
 Cape May Co.: Cook (G H), 57a  
 Sussex area: Blair, 13  
 Southern N. J.: Cook (G H), 56, 57; Pierce, 23a; Wheeler (E S), 76  
 Survey, reports: Cook (G H), 64, 65-89; Kitchell, 57; Kümmel, 02, 11, 16; Smock, 91-01; index to reports: Kümmel, 03  
 work of: Kümmel, 03  
 Trenton quadrangle: Bascom, 09b

*Economic geology.*

- Barytes, Sussex Co.: Chilton, 14  
 Building stone; Hawes, 84; Lewis (J V) 09; McCourt, 07; Morris Co.: Britton (N L), 88  
 Cement materials: Eckel, 13; Lehigh district: Eckel, 04c  
 Clay: Cook (G H), 74, 78, 78a; Jenkins, 99; Ries, 04; Smock, 79  
 Franklin Furnace quadrangle: Spencer (A C), 08c  
 Middlesex Co., map: Cook (G H), 78a  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 stratigraphy: Kümmel, 04  
 Copper: Apgood, 11; Keith (N S), 06; Kümmel 00, 09a; Weed, 03d, 11  
 Griggstown: Weed, 04b  
 Hunterdon Co., Flemington: Clemson, 34  
 Newark (Triassic) ores: Lewis (J V), 07a, d  
 New Brunswick: Beck, 39a  
 New Red sandstone: Credner, 66a  
 Passaic quadrangle: Darton, 08b  
 Schuyler mine: Granberry, 07  
 Watchung Mountain: Bond, 13  
 Fire clay: Cook (G H), 80; Smock, 79  
 Franklin Furnace: Kemp, 94c  
 Franklin Furnace quadrangle: Spencer (A C), 08d  
 Franklinite, Sussex Co.: Blake (W P), 95a; Nason, 94d  
 General: Cook (G H), 65, 68, 71-74, 79-89; Credner, 66a; Hamilton, 04; Jenkins, 98; Kitchell, 55, 56; Lewis (J V), 15; Mitchill, 28; Rogers (H D), 36, 40a; Anon, 55  
 Glass sand: Cook (G H), 78; Kümmel, 07a  
 Graphite, Franklin Furnace quadrangle: Spencer (A C), 08d; Passaic quadrangle: Darton, 08b  
 Hibernia deposits: Wolff, 94a  
 Hunterdon Co.: Larison, 81  
 Iron: Bayley, 09, 10a; Cook (G H), 73, 74, 79, 80, 83, 84; Jenkins, 92, 97, 98, 99, 00; Kitchell, 57a; Kümmel, 03a, 08b; Merritt, 92; Nason, 89a, 91a; Putnam, 86; Spencer (A C), 08b; Anon, 83  
 Franklin Furnace quadrangle: Spencer (A C), 08d  
 magnetite: Credner, 66a; Smock, 74, 76; Spencer (A C), 08b

## New Jersey—Continued.

*Economic geology—Continued.*

- Iron: Phillipsburg: Jackson, 59i  
 Ringwood: Nason, 95  
 Sussex Co.: Kitchell, 55a; Anon, 58; genesis: Spencer (A C), 04b  
 Limestones, Sussex and Warren cos.: Kümmel, 06; Franklin Furnace quadrangle: Spencer (A C), 08d  
 Manganese: Harder, 10; Franklin Furnace: Wolff, 03  
 Marl: Cook (G H), 55, 55a, 87  
 Mineral industry: Kümmel 01a, 08, 11a, 12, 16; Twitchell, 13, 14, 16  
 Mineral resources: Cook (G H), 64  
 Molding sands: Kümmel, 05  
 Northern N. J.: Kitchell, 56a  
 Ogdensburg: Kemp, 94c  
 Passaic quadrangle: Darton, 08b  
 Peat deposits: Kümmel, 07; Parmelee, 06  
 Philadelphia district: Bascom, 09a  
 Phosphorite, Hurdsville, Morris Co.: Alger, 50c  
 Portland cement: Kümmel, 01  
 Raritan quadrangle: Bayley, 14  
 Schuyler copper mine: Granberry, 07  
 Serpentine, Montville, Morris Co.: Merrill (G P), 88d  
 Slate: Dale, 06c  
 Somerset Co.: Messler, 81  
 Tale, Phillipsburg: Peck, 05  
 Trap rocks for road construction: Lewis (J V), 07e

Trenton quadrangle: Bascom, 09b

Zinc: Kümmel, 06b

Franklin, Sussex Co.: Alger, 45; Berthier, 20; Blake (W P), 95a; Bruce, 14b; Credner, 66a; Kemp, 94c, f; Kümmel, 03a; Spencer (A C), 08d, 09; Troost, 25b; Wolff, 98b, 03; Anon, 58

Sterling: Troost, 25b; Whitney, 47c

Zircon: Nason, 90

*Historical geology.*

- Archean: Britton (N L), 85b, 87, 87a; Nason, 89a; Wolff, 94a, 96, 97  
 Archean Highlands, eruptive granite: Wolff, 96b  
 Atlantic Highlands section, Cretaceous: Prather, 05  
 Bergen Hill region: Darton, 83  
 Bordentown quadrangle: Shattuck, 95  
 Borings: Cook (G H), 89; Kümmel, 05a; Vermeule, 05; Woolman, 96, 97  
 Atlantic City: Woolman, 88, 90  
 southern New Jersey: Woolman, 93  
 Cambrian, Sussex Co.: Nason, 94c  
 Camden Co., clays: Pilsbry, 97  
 Cape May Co.: Cook (G H), 57a  
 Coast formations: Merrill (F J H), 85  
 Coastal Plain formations: Clark (W B), 09a  
 Cretaceous: Clark (W B), 93a, 94, 95a, 97c, 98, 07; Cook (G H), 83, 84, 85a; Credner, 70; Knapp (G N), 07; Kümmel, 11b; Lea, 58a; Lyell, 44. Morton, 32; Weller, 05e; Whitfield, 85, 87  
 classification: Weller, 05a



## New Jersey—Continued.

*Historical geology*—Continued.

- Cretaceous: Cliffwood: Berry, 04; Hollick, 96g, 97c, f; Knapp (G N), 04a; Weller, 05  
 Moorestown: Woolman, 93a  
 Cretaceous marl belt: Britton (N L), 82b  
 Delaware Valley: Cresson, 89  
 Devonian, Upper: Barrell, 13a  
 Dover quadrangle: Miller (B I), 06  
 Eastern N. J.: Clark (W B), 93c  
 Fish beds, Boonton: Redfield, 43  
 Fish House: Pilsbry, 96a; black clay: Woolman, 97  
 Franklin, Sussex Co.: Vanuxem, 22a  
 Franklin Furnace quadrangle: Spencer (A C), 08d; pre-Cambrian: Spencer (A C), 05f  
 General: Conrad, 69; Cook (G H), 59, 64, 65, 68, 73, 83-85, 87, 87a; Cope, 68e, Darton, 96d; Harlan, 24a; Lewis (J V), 15; Kitchell, 55, 56; Kummel, 04; Morton, 29d, 30; Rogers (H D), 36, 40a  
 Geologic map: Cook (G H), 89a; Lewis (J V), 12a; N J G S, 18  
 Monmouth and Middlesex cos.: Clark (W B), 92  
 Geological section: Kummel, 09  
 Green Pond Mountain region: Darton, 85b, 94f; Kummel, 02a; Merrill (F J H), 87b; Walcott, 94e  
 Greensand deposits: Ashley, 17a; Lewis (S), 55; origin and classification: Clark (W B), 94a  
 Hibernia deposits: Wolff, 94a  
 Hibernia fold: Wolff, 94c  
 Highlands: Bayley, 09; Fenner, 14  
 age: Lesley, 65b  
 pre-Cambrian sedimentary rocks: Bayley, 14a  
 Hudson Co.: Russell, 80a  
 Hunterdon Co.: Larison, 81  
 Jenny Jump Mountain, Warren Co.: Westgate, 96  
 Jurassic: Lewis (H C), 80h  
 Kittatinny Valley, Paleozoic limestones: Kummel, 01b  
 Lavas, Newark system: Darton, 89a  
 Limestones, age: Dana (J D), 91b; Warren Co., age: Westgate, 94a  
 Lockatong formation, Triassic: Hawkins, 14  
 Magothy formation, Atlantic islands: Bibbins, 10  
 Map of northern N. J.: Cook (G H), 74a  
 Marl beds: Whitfield, 86d  
 Marl region: Cook (G H), 55a  
 Matawan formation: Clark (W B), 04b; Knapp (G N), 04a  
 Miocene: Clark (W B), 95e  
 Cumberland Co.: Heilprin, 87b  
 eastern N. J.: Clark (W B), 95f  
 Newark brownstone, age: Lyman, 94  
 Newark formation: Kummel, 97b; Finch (J), 26; physiographic conditions: Fenner, 08  
 Newark trap rocks: Lewis (J V), 07b, c  
 Newark trap sheets: Darton, 90  
 Newark system: Kummel, 97, 97a, 98, 99, 99b  
 Niagara limestone, Montague: Barrett (S T), 78a

## New Jersey—Continued.

*Historical geology*—Continued.

- Northern N. J.: Kitchell, 56a  
 Northwestern N. J.: Van Ingen, 00  
 Onondaga formation: Kindie, 12  
 Orange Mountain: Iddings, 86  
 Paleozoic: Weller, 03  
 early: Foerste, 93b  
 Green Pond Mountain region: Merrill (F J H), 87  
 Kittatinny Valley: Weller, 01  
 northwestern N. J.: Van Ingen, 01a  
 Palisades, Hudson River: Wurtz, 70a  
 Palisade Range, Triassic sandstone: Dana (J D), 71g  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 Post-Tertiary, Cumberland Co.: Britton (N L), 83  
 Pre-Cambrian: Spencer (A C), 05a  
 Quaternary: Salisbury, 17  
 Raritan quadrangle: Bayley, 14  
 Sand Hills, Middlesex Co.: Clark (W B), 97e  
 Sandstone, disintegrated, New Durham: Darton, 83a  
 Shark River Eocene deposits, age: Harris, 16  
 Shawangunk grit: Billingsley, 10  
 Silurian: Schuchert, 16a  
 Somerset Co.: Messler, 81  
 Southern N. J.: Coman, 91, 92; Cook (G H), 55, 56, 57; Woolman, 92  
 Sussex Co.: Kitchell, 55a; Nason, 91; Shepard, 32a; Wolff, 98  
 dike: Kemp, 93e  
 limestone, age: Cook (G H), 61; Nason, 91b; Wolff, 97a  
 Walpack Ridge: Weller, 00  
 Tertiary: Clark (W B), 93a, 94; Cook (G H), 83, 84, 85a; Kummel, 11b; Whitfield, 85  
 Trap, Orange: Heilprin, 85a  
 Trenton quadrangle: Bascom, 09b  
 Triassic: Cook, 79, 82, 89; Davis (W M), 83; Mawby, 94; Nason, 89, 89b; Newberry, 87c; Redfield, 51; Russell, 78b  
 Triassic trap rocks: Davis (W M), 82b; Russell, 78  
 Watchung trap sheet: Fenner, 08a, 10a; origin: Nason, 90c  
 Yellow gravel: Merrill (F J H), 87a  
 Zirconiferous rock: Nason, 90
- Mineralogy.*  
 Algerite, Franklin, Sussex Co.: Hunt, 49b, 50d; Jackson, 50c  
 Allanite, Franklin Furnace: Eakle, 94; Jackson, 51g  
 Amber: Wister, 14; Vincentown: Goldsmith, 79  
 Anorthite, Franklin Furnace: Warren (C H), 01  
 Apatite, Franklin Furnace: Penfield, 80a  
 Asphaltum, Vincentown: Goldsmith, 79  
 Automalite, Sussex Co., Franklin: Vanuxem, 22  
 Babingtonite, Passaic Co.: Fenner, 14a, b  
 Bementite, Franklin Furnace: Koenig, 87c  
 Bergen Hill minerals: Whitlock, 10b  
 Brushite, Camden: Dana (J D), 64b; Moore (G E), 64  
 Calcite, Bergen Hill: Rath, 77a, c; West Paterson: Whitlock, 07b



## New Jersey—Continued.

*Mineralogy*—Continued.

- Calcites, trap region, crystallography: Rogers (A F), 02b; Whitlock, 09
- Caswellite, Franklin Furnace: Chester (A H), 94a, 96a
- Catalog of minerals: Canfield, 89
- Cavities in First Watchung Mountain zeolite deposits: Wherry, 16f
- Cleiothane, Franklin: Henry, 51
- Clinohedrite, Franklin Furnace: Penfield, 98
- Copper, native, Franklin Furnace: Wolff, 98a
- Copper mineral: Bowen (G T), 24a
- Datolite, Bergen Hill: Dana (E S), 72a; Ford (W E), 09b; Great Notch: Cook (C W), 15; Somerset Co.: Hawkins, 15
- Fowlerite variety of rhodonite: Pirsson, 90a
- Franklin Furnace: Chester (A H), 94; Foote (W M), 98; Kemp, 94c; Koenig, 87, 87b, 89b, c; Nason, 94e; Palache, 08, 10; Penfield, 99b; Vanuxem, 22a, 24
- Franklinite, Franklin: Phillips (A H), 17
- Gageite, Franklin Furnace: Levison, 18; Phillips (A H), 10
- Gahnite, Franklin Furnace: Brush, 71
- General: Chester (A H), 01; Eyerman, 89b; Roepper, 70
- Hardystonite, Franklin Furnace: Wolff, 99, 00
- Hayesine, Bergen Hill: Darton, 82b
- Hetaerolite, Sterling Hill: Moore (G E), 77
- Heulandite, Upper Montclair: Moses, 93
- Hoboken: Nuttall, 21b
- Hodgkinsonite, Franklin Furnace: Palache, 13, 14b
- Hydrocarbon in eruptive rocks: Russell, 78a
- Hydromica: Clarke (F W), 99
- Jeffersonite, Sussex Co.: Keating, 22a; Pisani, 73
- Jerseyite: Goldsmith, 07
- List of minerals: Seymour, 68; Smock, 94b
- Magnesite, Hoboken: Bruce, 14
- Manganocalcite, Franklin Furnace: Levison, 16
- Marcasite, Sayreville: Hamilton, 99a
- Margarosanite, Franklin: Ford, 16a
- Meteorite, Deal: Shepard, 52; Vaux (R), 30
- Mullicite, Mullica Hill: Browne (P A), 49
- Newark igneous rocks: Levison, 09
- New Brunswick: Beck, 39a
- Orthoclase, Sussex Co.: Leeds, 72
- Orthoclase-bearing veins: Rogers (A F), 11c
- Paterson: Nuttall, 22; and Great Notch localities: Papke, 08
- Pectolite, Bergen Hill: Moses, 01; after quartz, Paterson: Glenn (M L), 17
- Phosphate of lime, Hurdstown: Jackson, 51
- Princeton minerals: Hawkins, 13
- Pseudomorph after anorthite, Franklin: Roepper, 78
- Pseudomorphs, Paterson: Hunt (J H), 90
- Pyrite: Kraus, 06d; Middlesex Co.: Marshall, 92
- Pyrite and stilbite: Honess, 17b
- Rhodochrosite, Franklin Furnace: Browning, 90
- Rhodonite, Franklin: Ford (W E), 11b
- Roebbingite, Franklin Furnace: Penfield, 97
- Schefferite, Franklin Furnace: Wolff, 00

## New Jersey—Continued.

*Mineralogy*—Continued.

- Secondary trap rock minerals, origin: Lewis (J V), 15a
- Serpentine: Berwerth, 75
- Snake Hill: Perry, 90
- Spartaite, Sterling: Tyler, 65
- Stevensite, Essex Co.: Glenn (M L), 16
- Stilbite, Upper Montclair: Moses, 93
- Sussex Co.: Fowler, 32
- Sussexite, Sussex Co.: Brush, 68
- Tephroite, Sussex Co.: Mixter, 68
- Thaumasite: Wherry, 18
- Great Notch: Brown (G V), 16a
- West Paterson: Penfield, 96a; Wherry, 17i
- Thomsonite: Canfield, 11
- Titanite: Wherry, 16a
- Torrelite, Andover Furnace, Sussex Co.: Renwick, 23
- Trap minerals: Beck, 43a; Kunz, 88d
- Weehawken tunnel: Chamberlin (B B), 83; Darton, 82a
- Willemite, Sussex Co.: Mixter, 68; Palache, 13a; Penfield, 94b
- Zeolite deposits, First Watchung Mountain, genesis: Gordon (S G), 16a
- Zeolites, Bergen: Bourne, 41
- Zincite, Sussex Co.: Alger, 61; Phillips (A H), 11
- Zircon, Trenton: Conrad, 14
- Paleontology.*
- Acidaspis, Marcellus shale: Hitchcock (C H), 03
- Adocidae: Cope, 71f
- Adocus, Cretaceous: Cope, 70g
- Anomalophyllites, Bridgeton: Hollick, 97a
- Araucarian remains: Berry, 08a
- Archean plant, Sussex Co.: Britton, 88a
- Atlantochelys: Agassiz (L), 49
- Aublysodon: Leidy, 68f
- Barornis, Eocene: Marsh, 94h
- Bauhinia, Cretaceous: Newberry, 86b
- Belemnites ambiguus: Roemer, 80
- Brachiopoda, Cretaceous: Clark (W B), 95c
- Cambrian trilobites: Weller, 00a
- Camden Co.: Foulke, 58
- Cephalopoda, Mullica Hill: Browne (P A), 49
- Cervales, Quaternary: Scott (W B), 85; Warren Co.: Scott (W B), 85a
- Cetacea, green sand: Leidy, 53e
- Clidastes, Monmouth Co.: Cope, 81p
- Cliffwood clays, fauna: Weller, 05, 05f; flora: Berry, 06d
- Cretaceous: Conrad, 52a; Credner, 70; Gabb, 61d, 77; Mitchill, 14b; Morton, 30, 30a, 41b, 46; Weller, 07; Whitfield, 85, 92
- Bryozoa: Gabb, 60f; Gregory (J W), 09
- Cliffwood: Hollick, 96g, 97c
- coprolites: Dekay, 30, 30a
- crocodile: Morton, 44a
- Foraminifera: Bagg, 98a
- Gastropoda: Whitfield, 93a
- lignites, Cliffwood: Holden, 14
- Mollusca: Gabb, 60c, 61e; Haddonfield: Lea, 61
- Moorestown: Woolman, 93a
- Mount Laurel: Johnson (C W), 98
- palm: Stevens (N E), 12a



## New Jersey—Continued.

*Paleontology*—Continued.

- Cretaceous: *Pityoxyla*, Cliffwood: Holden (R), 13  
*Pityoxylon*: Bailey (L W), 10a  
 sponge: Shimer, 13a  
 Timber Creek: Conrad, 50  
 Cretaceous and Tertiary invertebrates: Conrad, 68b  
 Crocodile: Harlan, 24a  
 Crustacea: Van Rensselaer, 25a; Cretaceous: Pilsbry, 01  
*Cylindracanthus*, Burlington Co.: Leidy, 56b  
*Desmatocium*, Mullica Hill: Gabb, 60g  
 Diatomaceae, Triassic: Edwards (A M), 93c; Wildwood: Boyer, 95a  
 Dicotyles, Shark River: Marsh, 70d  
 Dinophis, Tertiary: Marsh, 69c  
 Dinosaur: Woolman, 97; Cretaceous: Cope, 66b  
 Dinosaur tracks, Avondale: Woodworth, 95  
 Discoliths: Edwards (A M), 93a  
 Elk: Scott (W B), 85b  
 Eocene Mollusca, Monmouth Co.: Conrad, 65i  
*Fasciolaria*, Shark River: Whitfield, 05b  
 Fish House black clay: Woolman, 97  
 Flora, Amboy clays: Newberry, 86a, 95; Yellow Gravel, Bridgeton: Hollick, 92  
 Footprints, Hunterdon Co.: Eyermann, 89b  
 Foraminifera, Cretaceous: Bagg, 95a; Reuss, 61; Woodward (A), 94  
 Gavia: Dekay, 36; Eocene: Marsh, 70a  
*Geinitzia gracillima*: Jeffrey, 11  
 Geosaurus: Dekay, 30  
 Glacial man, relics: Wright (G F), 96b, 11a  
 Greensand: Leidy, 51e  
 Hadrosaurus: Leidy, 58g  
 Holops, Cretaceous: Cope, 72i  
 Leguminous pods, Bridgeton: Hollick, 92, 96  
*Leptomylus*, Cretaceous: Cope, 70i  
*Liriodendron*, Amboy clays: Newberry, 87a  
*Lophiodon*, Cumberland Co.: Marsh, 71h  
 Mammalia: Cope, 68a  
 Mammoth, Schooley's Mountain: Stewart (T P), 28  
 Mastodon: Van Rensselaer, 26  
 Freehold: Lockwood, 83  
 Hackettstown: Maxwell, 45  
 Monmouth Co.: Dekay, 24  
 Plattsburg: Hallowell, 46  
 Schooley's Mountain: Jackson (J B S), 45  
 Matawan flora, Cliffwood: Berry, 03, 03b, d, 04a, 05  
 Mesozoic flora: Berry, 09a, 11j  
 Miocene, Cumberland Co.: Heilprin, 87b; Mollusca: Conrad, 66b; Heilprin, 88b; Mollusca and Crustacea: Whitfield, 94  
 Mollusca: Conrad, 69d, f, 70  
 Cretaceous: Conrad, 53c; Forbes, 45; Morton, 29c  
 Pleistocene, White Pond: Baker (F C), 03; Leidy, 45  
 Triassic: Conrad, 69b  
 Mosasaurus: Dekay, 30; Leidy, 59a; Whitfield, 00c  
 greensand: Marsh, 69b  
 Mount Holly: Morton, 44b  
 Mosasaurus occidentalis: Morton, 45  
 Newark fossils: Edwards (A M), 95a

## New Jersey—Continued.

*Paleontology*—Continued.

- Northwestern N. J.: Van Ingen, 00  
*Palaeophis*, Monmouth Co., N. J.: Cope, 68d  
*Palaeophycus*, Milford: Lewis, 80m  
 Paleobotany: Hollick, 99b  
 Paleozoic faunas: Weller, 03  
 Palm, Cretaceous: Berry, 16h  
 Palmula, Timber Creek: Lea, 33  
 Phytosaur, Palisades: Huene, 13  
 Pisces: Leidy, 55a  
 Cretaceous and Tertiary: Marsh, 70e  
 Cretaceous, Eocene, and Miocene: Fowler, 11  
 Newark group: Redfield, 53  
 Pompton: Redfield, 43a  
 Tertiary: Cope, 69a  
 Triassic, Weehawken: Gratacap, 86  
 Plants, Magothy formation: Berry, 07f  
 Pleistocene flora: Berry, 10d  
*Pleurotomaria*, Cretaceous, New Jersey: Pilsbry, 96  
*Pleurotomiidae*: Pilsbry, 12  
 Polyparia, Timber Creek: Lonsdale, 45  
 Raritan flora: Berry, 11  
 Reptilia: Cope, 67, 68, 68g, l, 69c; Marsh, 70c  
 Eocene: Cope, 72j  
 greensand: Owen (R), 49  
 Mullica Hill: Harlan, 25  
 Rhinoceros, Squankum: Marsh, 70c  
 Saurodon, Moorestown, N. J.: Hays, 30  
*Sphenosaurus*: Agassiz (L), 49  
 Stone implements in glacial drift, Trenton: Belt, 78  
 Tertiary: Whitfield, 85, 92  
*Thoracosaurus*: Leidy, 52f  
 Tilia from the Pleistocene: Berry, 07a  
 Timber Creek: Morton, 29e  
 Tortoises, Cretaceous: Cope, 71s, 72v  
 Triassic: Newberry, 76c, 87c, 88; Pisces: Eastman, 05a; Newberry, 88; Plantae: Newberry, 88  
 Trilobites, Beekmantown: Raymond (P E), 10  
*Trochocyathus*, Cretaceous: Vaughan, 00d  
 Turtles: Leidy, 56o; Cretaceous: Wieland, 04  
*Unionidae*, Cretaceous: Lea, 68  
 Vertebrata: Leidy, 56j  
 greensand: Cope, 75n  
 Miocene, Cumberland Co.: Cope, 75i  
 Vincentown: Gabb, 76  
*Petrology*.  
 Contact phenomena, Palisade diabase: Andrae, 93  
 Diabase, Atlantic region, composition: Hawes, 82  
 Dike of elaeolite syenite: Emerson (B K), 82  
 Dikes, Sussex Co.: Emerson (B K), 82a; Kemp, 93e  
 Dolerite, Jersey City: Dana (J D), 81  
 Elaeolite syenite, Beemerville: Kemp, 92d  
 Franklin Furnace, post-Ordovician igneous rocks: Wolff, 08a  
 Gneisses, Highlands: Fenner, 14  
 Granite: Watson, 10a  
 Jenny Jump Mountain, Warren Co.: Westgate, 96  
 Lavas, Newark system: Darton, 89a  
 Leucite, Sussex Co.: Kemp, 94e  
 Leucite tinguaita, Beemerville: Wolff, 02a



## New Jersey—Continued.

*Petrology*—Continued.

Limestones, Sussex Co.: Nason, 94b; Warren Co.: Westgate, 94

Minerals of the Newark igneous rocks: Levison, 09

Nepheline syenite, Bookville: Ransome, 99

Newark intrusive diabase: Lewis (J V), 08a

Orange Mountain: Iddings, 86

Palisade diabase: Lewis (J V), 08; contact phenomena: Irving, 99a

Palisades, Hudson River: Dana (J D), 72f; Wurtz, 70a; felsites: Schweitzer, 71a

Pillow lavas, Watchung Mountains: Lewis (J V), 15b

Porphyrite bosses, northwestern N. J.: Kemp, 89b

Sandstones, analyses: Schweitzer, 71

Scapolite rock: Nason, 90a

Secondary trap rock minerals, origin: Lewis (J V), 15a

Serpentine rocks, Hoboken: Nuttall, 21b; Montville, Morris Co.: Merrill (G P), 88, 88d

Trap, Rocky Hill: Phillips (A H), 99

Triassic sandstone, Palisade Range: Wurtz, 72

Watchung basalt: Fenner, 10, 10b

Zeolite deposits, First Watchung Mountain, genesis: Gordon (S G), 16a

*Physical geology*.

Coast changes: Beesley, 80; Haupt, 06; Johnson (D W), 14, 15a

Coast erosion: Merrill (F J H), 85; Woodman, 96, 96a

Concretions from Redbank sands: Willcox, 06a

Dikes, Triassic: Rogers (H D), 43e

Faulting, Sterling Hill: Farrington (A C), 52a

Fulgurite from Raritan sands: Barrows (W L), 10

Glaciation effects on Cretaceous clays: Hawkins, 10

Greensands, origin and classification: Clark (W B), 94a

Limestone, Franklin: Jackson, 54a

Mesozoic fault: Lyman, 93

Palisade diabase, intrusion temperature: Sosman, 13

Pebbles and boulders, Keyport: Newberry, 73e

Rain marks, Triassic: Redfield, 51a

Sandy Hook: Bache, 45

Segregation process, Highlands: Tarr, 94d

Subsidence, coast: Cook, (G H) 57b

Subsidence, supposed, of coast: Johnson (D W), 10b

*Physiographic geology*.

Delaware Water Gap: Walter, 95; origin: Stose, 16a

Double crest of Second Watchung Mountain: Lewis, 07

Drift phenomena: Salisbury, 91d, 92

Englewood: Dwight, 66

southern limit: Cook (G H), 79a

Eskers: Culver, 94a

Extra-morainic drift phenoma: Salisbury, 92a; Wright (A A), 92; Wright (G F), 93d

General: Davis (W M), 88b; Salisbury, 98a

Glacial and preglacial drifts: Britton (N L), 87b

## New Jersey—Continued.

*Physiographic geology*—Continued.

Glaciation: Cook (G H), 77, 78, 80; Salisbury, 02; Smock, 83

Franklin Furnace quadrangle, Salisbury, 03 limit: Wright (A A), 93a

Palisade ridge: Peet, 94

Sussex Co.: Salisbury, 94e

Trenton region: Belt, 78

Hunterdon Co.: Larison, 81

Lake Passaic: Kümmel, 94; Salisbury, 95b

Manasquan Inlet changes: Kümmel, 09b

Moraines, terminal: Upham, 79

Northern N. J.: Davis (W M), 90b; Lobeck, 18

Pleistocene: Shattuck, 01

Pleistocene loams: Salisbury, 00b

Raritan quadrangle: Bayley, 14

Rivers, northern N. J.: Davis (W M), 90a

Sandy Hook: Bache, 45

Shorelines, ancient: Merrill (F J H), 90a

Somerset Co: Messler, 81

Surface geology: Salisbury, 93, 94, 95, 96, 97, 98; Southern N. J.: Salisbury, 95e, 01

Terraces, Delaware River: Winchell (N H), 14b

Trenton gravels: Holmes, 97; Hollick, 97d; Lewis (H C), 80n, 81, 81a; Martin (D S), 85; Salisbury, 97b; Volk, 11; Woodman 11; Woodworth, 11a; Wright (G F), 97, 11; age: Kümmel, 98a; Wright (G F), 81a

*Underground water*.

Artesian wells: Woolman, 96

Atlantic City: Woolman, 89

southern N. J.: Woolman, 91, 92, 93

Essex Co.: Vermeule, 05

General: Cook (G H), 79, 82, 84, 85, 89; Darton, 96d; Knapp, 04; Smock, 92

Highlands region: LaForge, 05

Philadelphia district: Bascom, 09a

Well records, 1905-09: Kümmel, 10

New Madrid earthquake: Sampson, 13

## New Mexico.

Carbonaceous deposit near Putnam: Foster (W), 13

Estancia Valley: Meinzer, 11

Foothills region: Conkling, 77b

General: Abert (J W), 48; Blake (W P), 56a; Cope, 75za; Emmons (S F), 85; Emory, 48; Hayden, 76e, 77; Loew, 80; Marcou, 55; Marcy, 50; Simpson (J H), 50; Wislizenus, 48

Gila region: Blake (W P), 94a

Luna Co.: Darton, 11c

Mexican boundary region: Emory, 57a; Marcou, 67b

Southern N. Mex.: Parry, 57

Syllabus of geology: Keyes, 15

Tucumcari Mountain: Cummins, 93a; Marcou, 93b

*Economic geology*.

Alum, Gila River, Grant Co.: Hayes, 07

Alunogen, Gila region: Blake (W P), 94a, 95b

Anthracite: Griffith, 06; Raymond, 74

Apache Canyon, south central N. Mex.: Keyes 03d

Apache district: Wade (W R), 14

Azure turquoise mine: Dinsmore, 10b

Bauxite, Gila region: Blake (W P), 94a, 95b



## New Mexico—Continued.

*Economic geology—Continued.*

- Black Range district: Fishback, 10; Wright (J W), 09
- Burro Mountain district: Bush, 14; Paige, 11b; Stauber, 10
- Cement materials: Eckel, 13
- Clay: Herrick, 00d; Shaler (M K), 07a; carbonaceous: Foster (W), 13
- Coal: Griffith, 06; Ritter, 06b
- Carthage field: Gardner (J H), 10a
- Cerrillos field, Santa Fe Co.: Lee (W T), 13a; Stevenson, 96
- Carboniferous: Gardner (J H), 10d
- Cretaceous: Le Conte (J L), 68b
- Dawson: Sheridan, 09
- Durango-Gallup field: Schrader, 06; Shaler (M K), 07b
- Durango-Monero field: Gardner (J H), 09a
- Engle field: Lee (W T), 06b
- Fort Stanton Reservation: Campbell (M R), 07c
- Gallina-Raton Spring field: Gardner (J H), 09
- Gallup Basin: Kirk, 14
- Gallup-San Mateo field: Gardner (J H), 09b
- Hagan field, Sandoval Co.: Keyes, 04d
- Jemez field: Reagan, 03c
- Lincoln Co.: Campbell (M R), 07c
- northeastern N. Mex.: Van Diest, 90a
- Mescal Canyon field: Keyes, 07f
- north central N. Mex.: Lee (W T), 12b
- northern N. Mex.: Judd (E W), 05
- Omara and Pecos River fields: Gardner (J H), 10
- Raton field: Judd (E K), 07c; Stevenson, 82a
- Sandoval Co.: Campbell (M R), 07b
- San Mateo-Cuba field: Gardner (J H), 10b
- San Miguel Co.: Gardner (J H), 10d
- Sierra Blanca field: Wegemann, 14
- Tijeras field, Bernalillo Co.: Lee (W T), 12
- Una del Gato field: Campbell (M R), 07b
- White Mountain region: Fisher (C A), 04
- Cochiti district: Barbour (P E), 08; Statz, 12b; Wynkoop, 00
- Cooney district, Socorro Co.: Andersen, 95; Graham (B), 06; Weatherby, 01
- Copper: Austin, 02a; Cazin, 80; Lindgren, 06b, 10; Weed, 06; Wendt, 87
- Apache district: Wade (W R), 14
- Bent: Ball (S H), 13
- Black Range mining district: Wright (J W), 09
- Burro Mountain district: Bush, 14; Lang (S S), 06; Paige, 11b; Reid (G D), 02; Somers, 15; Stauber, 10; Wade, 07
- Cooney district: Graham (B), 06
- depths at which formed: Keyes, 09d
- Grant Co.: Snow, 93; Pinos Altos district: Blood, 16
- Hell Canyon district: Statz, 12a
- in red beds: Turner, 16
- Lordsburg region: Jones (F A), 07
- Magdalena district: Argall, 08a; Haddon, 06
- Mora Co.: Austin, 98
- Pinos Altos district: Paige, 11a
- San Andreas and Caballo Mountains: Herrick, 98a

## New Mexico—Continued.

*Economic geology—Continued.*

- Copper: San Pedro, Santa Fe Co.: Berryman, 18
- San Pedro Mountains: Brinsmade, 08d; Herrick, 87
- Santa Rita: MacDonald (D F), 16b
- Sierra Oscura: Peters, 82; Turner, 03a
- Silver City: Brinsmade, 08e
- White Pine district: Larsh, 09
- Yerington: Jennings, 09; Ransome, 09c
- Zuñi Mountains: Schrader, 06b
- Deming quadrangle: Darton, 17
- Economic geology, epitome: Jones (F A), 08
- Florida Mountains: Becker (C M), 14b
- Fluorine in sericitization, Tyrone district: Paige, 18
- Fluorspar: Burchard, 11c; near Deming: Darton, 11a
- Gallup Basin: Kirk, 14
- General: Frazer, 69; Hayden, 69; Herrick, 00d, 01; Jones (F A), 03; Owen (R E), 65
- Gold: Carruth, 10; Lindgren, 06b, 10
- Baldy: Lee (W T), 16
- Black Range district: Fishback, 10; Wright (J W), 09
- Cochiti district: Barbour (P E), 08
- Cooney district: Graham (B), 06
- Grant Co.: Pickard, 12
- Lordsburg region: Jones (F A), 07
- Pinos Altos district: Bush, 15; Paige, 11a; Wright (I L), 15
- San Pedro Mountain: Brinsmade, 08d
- Santa Fe Co.: Jones (F A), 06; Statz, 12
- Santa Fe region: Blake (W P), 59a
- Silver City: Brinsmade, 08e
- Sylvanite: Dinsmore, 08a; Jones (F A), 08a, b
- Taos and Arriba cos.: Silliman (jr), 80
- Gold gravels: Carruth, 10
- Gold placers, arid regions: Stone (G H), 99b
- Graphite, Raton district: Lee (W T), 13
- Gypsum: Herrick (H N), 04
- northwestern N. Mex.: Shaler (M K), 07
- Tularosa Basin: Meinzer, 15
- Gypsum sand: Brady, 05
- Hell Canyon mining district: Statz, 12a
- Hot springs at Ojo Caliente: Lindgren, 10a
- Iron, Chupadera Mesa: Keyes, 04c
- Hanover deposits: Paige, 09
- Jones fields: Emmens, 06
- Kelly camp: Brinsmade, 06a; Johnson (W M), 07
- Lake Valley: Keyes, 08; MacDonald (B), 09
- Lead: Lindgren, 10
- Grant Co.: Larsh, 13
- Kelly mine: Johnson (W M), 07
- Lordsburg district: Fry (E D), 10; Jones (F A), 07
- Magdalena district: Argall, 08a; Haddon, 06; Tuttle, 12
- Magdalena Mountains: Herrick, 97
- San Andreas and Caballo Mountains: Herrick, 98a
- San Pedro Mountain: Brinsmade, 08d
- Silver City: Brinsmade, 08e
- Tres Hermanas district: Lindgren, 09a
- Lead-vanadium ores, Grant Co.: Larsh, 13
- Lignite: Lesquereux, 73
- Luna Co.: Darton, 16



## New Mexico—Continued.

*Economic geology—Continued.*

- Magdalena district: Statz, 12c; Tuttle, 12  
 Manganese: Wells (E H), 18  
 Meerschaum: Bush, 15c; Michel, 14  
 Mescal Canyon coal field: Keyes, 07f  
 Mica deposits, Rio Arriba Co.: Sterrett, 13  
 Mineral deposits: Lindgren, 06b  
 Mineral resources: Jones (F A), 15; Jemez-Albuquerque region: Reagan, 12  
 Mining map: Jones (F A), 15  
 Mogollon Range: Andersen, 97; Weatherby, 01  
 Navajo country: Gregory (H E), 17  
 Northern N. Mex.: Stevenson, 81  
 Ore deposits: Lindgren, 10; Tovote, 18  
 Organ Mountain district: Welsh, 14  
 Oro Grande mine, Grant Co.; Pickard, 12  
 Petroleum, Dayton: Richardson (G B), 14a  
 Pinos Altos district, Grant Co.: Blood, 16; Bush, 15; Paige, 11a; Wade (W R), 14a; Wright (I L), 15  
 Placers, Santa Fe Co.: Jones (F A), 06; Statz, 12  
 Red River district, Taos Co.: Bush, 15a  
 Rio Grande Valley: Gordon (C H), 07  
 Rio Mora: Keyes, 10m  
 Salt: Herrick, 00d; Zuñi deposits: Darton, 05d  
 San Pedro district, Santa Fe Co.: Berryman, 18; Yung, 03  
 San Pedro Mountain: Brinsmade, 08d  
 Santa Fe region: Blake (W P), 59a  
 Santa Rita region: Paige, 12d  
 Sierra de los Caballos, south central N. Mex.: Keyes, 05f  
 Sierro del Oro, northern N. Mex.: Keyes, 18d  
 Silver: Haddon, 06; Lindgren, 06b, 10  
   Black Range district: Fishback, 10; Wright (J W), 09  
   Cochiti district: Barbour (P E), 08  
   Lake Valley district: Clark (E), 95; Cope, 81t; Keyes, 08; MacDonald (B), 09  
   Lordsburg region: Jones (F A), 07  
   Magdalena district: Tuttle, 12  
   Pinos Altos district, Grant Co.: Blood, 16; Paige, 11a  
   Rio Grande Valley: Gordon (C H), 07  
   San Pedro Mountain: Brinsmade, 08d  
 Silver pipe, central N. Mex.: Keyes, 03c  
 Silver City district, southwestern N. Mex.: Brinsmade, 08e; Furman, 85; Paige, 16  
 Socorro Co., Slayback lode: Henrich, 89a  
 Southern N. Mex.: Endlich, 83; Silliman (jr), 82a  
 Steeple Rock district, Grant Co.: Bush, 15b  
 Sulphur, Jemez Canyon: Mansfield (G R), 18a  
 Sylvanite, the new gold camp: Dinsmore, 08a; Jones (F A), 08a, b  
 Tres Hermanas district: Lindgren, 09a; Wade, 13  
 Tripoli, Socorro: Herrick, 96  
 Tungsten, Burro Mountains: Paige, 12c  
 Turquoise: Fenderson, 97; Jones (F A), 09; Silliman (jr), 80, 80b; Zalinski, 07c  
   Burro Mountains: Zalinski, 08a  
   Cerrillos Hills: Johnson (D W), 03  
 Vanadium: Larsh, 11; Leatherbee, 11  
   Sierra Co.: Leatherbee, 10  
   Sierra de los Caballos: Hess, 13

## New Mexico—Continued.

*Economic geology—Continued.*

- White Oaks: Smith (E P), 04  
 Zinc: Lindgren, 10  
   carbonate ores, Magdalena Mountains: Keyes 05e  
 Kelly camp: Brinsmade, 06a; Johnson (W M), 07  
 Magdalena district: Argall, 08a; Haddon, 06; Tuttle, 12  
 Pinos Altos district: Paige, 11a  
 Silver City: Brinsmade, 08e  
 southwestern N. Mex.: Blake (W P), 95  
 Tres Hermanas district: Lindgren, 09a; Wade, 13  
*Historical geology.*  
 Afton craters: Lee (W T), 07d  
 Albuquerque district: Bryan, 09  
 Albuquerque region: Herrick, 98, 98c, 00b  
 Apache Canyon, south central N. Mex.: Keyes, 03d  
 Basalt fields: Dutton, 84d  
 Burlington limestone: Springer, 84  
 Burro Mountains: Somers, 15  
 Carbonic column of Rio Grande region: Keyes, 09m  
 Carboniferous coal measures in Sierra Ladrones: Keyes, 06f  
 Carboniferous stratigraphy: Keyes, 06a; Richardson (G B), 10a  
 Carthage coal field: Gardner (J H), 10a  
 Cerrillos coal field, Santa Fe Co.: Lee (W T), 13a; Stevenson, 96a  
 Cerrillos Hills: Johnson (D W), 03  
 Coal, Sierra Blanca field: Wegeman, 14  
 Coal fields around southern end of Rocky Mountains: Lee (W T), 12b  
 Coal Measures: Herrick, 00; Socorro: Herrick, 04  
 Comanche series: Hill (R T), 95a  
 Cretaceous, Ojo Alamo beds: Brown (B), 10  
   Rocky Mountain region: Lee (W T), 15a  
   western N. Mex.: Winchester, 14  
 Dakotan series: Keyes, 06c  
 Deming quadrangle: Darton, 17  
 Eastern N. Mex.: Hill (R T), 92; Van Diest, 90  
 Eocene faunal horizons: Granger, 14  
 Estancia Plains: Keyes, 08b  
 Florida Mountains: Becker (C M), 14b  
 Galisteo Creek: Stevenson, 79c  
 Gallup Basin: Kirk, 14  
 General: Antisell, 56; Bailey (J W), 48; Blake, (W P), 56a; Cope, 75c, u, w; Gilbert, 75a; Hayden, 69, 71; Herrick, 98c, 01; Howell (E E), 75; Jewett, 05; Keyes, 03h; Le Conte (J L), 75; Lindgren, 10; Loew, 75; Marcou, 54a, 56, 58, 58a; Newberry, 59a, 61, 76  
 Geological section: Keyes, 06d  
 Jemez coal field: Reagan, 03c  
 Jemez Plateau: Kelly, 13  
 Jemez-Albuquerque region: Reagan, 03  
 Jornada del Muerto region: Keyes, 03a, 05; Shumard (G G), 59  
 Jurassic: Keyes, 05c  
 Lake Valley beds, age: Cope, 82zg  
 Lake Valley district: Cope, 81t; Keyes, 08



## New Mexico—Continued.

*Historical geology*—Continued.

- Lake Valley limestone: Keyes, 05i  
 Laramie group: Stevenson, 79b, 81a, 82a  
 Lava fields: Dutton, 85a  
 Limitar Volcano: Herrick, 98b  
 Loup Fork beds, Gila River: Cope, 84m  
 Loup Fork formation: Cope, 84c  
 Luna Co.: Darton, 16  
 Magdalena and Black Range region: Gordon (C H), 07c  
 Magdalena Mountains: Herrick, 97, 98b; Keyes, 05e, i  
 Manzano group, Rio Grande Valley: Lee (W T), 09b  
 Mesozoic: Marcou, 89f; Stevenson, 89  
 Mississippian formations, Rio Grande Valley: Gordon (C H), 07  
 Mogollon Range: Henrich, 89a  
 Morrison formation: Darton, 15d; Mook, 16  
 Morrison shales: Lee (W T), 02  
 Mount Taylor region: Dutton, 85; Shimer, 08a; volcanic necks: Johnson (D W), 07a  
 Mud and lava deposits: Cope, 82m  
 Navajo country: Gregory (H E), 16a, 17  
 Northeastern N. Mex.: St. John, 76  
 North central N. Mex.: Lee (W T), 12b  
 Northern N. Mex.: Conkling, 76; Lesquereux, 73; Stevenson, 79, 81, 81b  
 Northwestern N. Mex.: Darton, 10a  
 Ortiz Mountains: Keyes, 09d; Ogilvie, 08  
 Paleozoic, lower, southern N. Mex.: Darton, 17c  
 Paleozoic formations: Gordon (C H), 06; central N. Mex.: Lee (W T), 08b; southern N. Mex.: Darton, 17a  
 Pennsylvanian formations, Rio Grande Valley: Gordon (C H), 07a  
 Permian, Guadalupe Mountains: Shumard (B F), 58; Pecos Valley: Wrather, 17  
 Permian, Triassic, and Jurassic: Huene, 11  
 Permo-Carboniferous, northern N. Mex.: Wil-liston, 12c  
 Pre-Cambrian: Keyes, 05b; at Hamilton mine: Lindgren, 06f  
 Puerco and Torrejon formations: Gardner (J H), 10e  
 Raton coal field, unconformity in: Lee (W T) 09a, e  
 Raton Mesa region: Knowlton, 13; Lee (W T), 09a, 11, 17; igneous rocks: Mertie, 13a  
 Red beds: Case, 13, 14; Darton, 14d; Lee (W T), 07c, 08c; Rio Grande Valley, age: Case, 16  
 Rio Grande Valley: Henderson (J), 13; Lee (W T), 07b; Mississippian formations: Gordon (C H), 07  
 Roswell area: Fisher (C A), 06b  
 Saline basins, central N. Mex.: Johnson (D W), 02b  
 San Andreas and Caballo Mountains: Herrick, 98a  
 Sandia Mountains: Herrick, 98c  
 San Juan Basin: Sinclair, 14b; Paleocene deposits: Sinclair, 14a  
 San Juan Co.: Bauer, 16; Knowlton, 16a  
 San Pedro district, Santa Fe Co.: Berryman, 18; Herrick, 98c  
 San Simon Valley: Schwennesen, 17

## New Mexico—Continued.

*Historical geology*—Continued.

- Santa Fe region: Blake (W P), 59b  
 Santa Rita region: Paige, 12d  
 Sierra de los Caballos, south central N. Mex.: Keyes, 05  
 Silver City quadrangle: Paige, 16  
 Socorro and Valencia cos.: Herrick, 00a  
 Socorro Mountain: Herrick, 98b  
 Southeastern N. Mex.: Shumard (G G), 58a  
 Southern N. Mex.: Darton, 16d; Endlich, 83  
 Southwestern N. Mex.: Webster, 96  
 Table of formations: Keyes, 15a, o  
 Tertiary: Cope, 74d; Keyes, 07d  
 Tijeras coal field, Bernalillo Co.: Lee (W T), 12  
 Triassic: Keyes, 05d  
 Tucumcari Mountain: Cummins, 92a, 93b; Hill (R T), 93h  
 Tuartos Mountains: Keyes, 09d  
 Tularosa Basin: Meinzer, 15  
 Unconformities, significance: Keyes, 06b  
 Unconformity, at base of Cretaceous: Keyes, 04b  
 Valencia Co.: Johnson (D W), 02  
 White sands region: Herrick, 00c  
 White Oaks: Smith (E P), 04  
 Zuni Plateau: Dutton, 85

*Mineralogy*.

- Aurichalcite, Magdalena Mountains: Keyes, 04e  
 Azurite, Socorro City: Paul, 12  
 Calamine crystals, Organ Mountains: Ford (W E), 09c  
 Calcite: Schaller, 08a  
 Caledonite, Las Cruces: Farrington, 00  
 Copper ore, Chloride: Baumhauer, 85  
 Descloizite: Hillebrand, 89a  
 Dona Ana Co.: Genth, 85c  
 Endlichite: Bowman (H L), 03  
 Galena crystals, Sierra Co.: Chisolm, 89  
 General: Lindgren, 10; Loew, 75a; Stone (G H), 01  
 Grant Co.: Hillebrand, 89  
 Jarosite: Hillebrand, 02  
 Meerschauum: Sterrett, 08, 08b  
 Melanotekite, Hillsboro: Warren, 93  
 Meteorite: Genth, 54  
 Albuquerque: Eakins, 86  
 Bonanza: Shepard, 67b  
 Canonicito, Santa Fe Co.: Kunz, 85b  
 Costilla: Hills, 98a  
 El Capitan Mountains: Howell (E E), 95  
 Glorieta Mountain, Santa Fe Co.: Cohen, 91, 92; Hills (R C), 14; Kunz, 86a, c, 871  
 Kingston siderite: Hovey, 12e  
 Luis Lopez, Socorro Co.: Preston (H L), 00a  
 Oscuro Mountain: Hills (R C), 02  
 Sacramento Mountains, Eddy Co.: Foote, 97  
 Nickel-skutterudite, Grant Co.: Waller, 92  
 Plumbojarosite: Hillebrand, 02  
 Pseudomorphs, copper after azurite, Grant Co.: Yeates, 89  
 Selenite, Fort Stanton: Hills, 95b  
 Sequisulphate of iron: Pearce, 90  
 Silver City: Packard (R L), 94  
 Turquoise: Blake (W P), 58; Clarke (F W), 86b, 87; Cowan, 08  
 Burro Mountains, Grant Co.: Hidden, 93c; Paige, 12c; Snow, 91; Zalinski, 07c



## New Mexico—Continued.

*Mineralogy*—Continued.

- Vanadate, Lake Valley: Genth, 85c  
 Vanadates and iodyrite, Sierra Co.: Genth, 85b  
 Vanadinite: Paul, 12; Penfield, 86d  
 Willemite, new occurrence: Lindgren, 08e;  
 Socorro Co.: Penfield, 94b

Wulfenite, Jarilla Mountains: Ingersoll, 94

*Paleontology*.

- Antelope deer, Santa Fe marls: Cope, 75r  
 Araucarioxylon: Knowlton, 88  
 Ashmunella: Cockerell, 03  
 Belodon: Cope, 81v  
 Bird, Loup Fork marls: Cope, 75v  
 Bryozoa: Prout, 58  
 Burlington limestone: Springer, 84  
 Carboniferous: Hall, 56; Keyes, 04g; Newberry,  
 76a; White (C A), 81  
 Cerillos Hills: Johnson (D W), 03  
 Champsosaurus: Cope, 81r  
 Chara, Las Vegas: Knowlton, 02d  
 Chirox, Puerco beds: Cope, 87h  
 Coal Measure forest: Herrick, 04  
 Coelophysis, Triassic: Cope, 89g  
 Conchochelys, Puerco beds: Hay (O P), 05b  
 Coryphodon radians: Osborn, 98c  
 Cretaceous: Meek, 76d  
 Diadectes lentus: Case, 12a  
 Eocene, bird: Cope, 76a  
 faunas: Cope, 76c  
 Mammalia: Cope, 81i; Wortman, 01a  
 Vertebrata: Cope, 75b, 77, 82a  
 Eryopsoides, Permian: Douthitt, 17  
 Gastropoda, Tertiary: Cockerell, 15  
 General: Bailey (J W), 48; Cope, 75u; New-  
 berry, 61  
 Guadalupe Mountains: Shumard (BF), 58d,  
 f, 59a  
 Haploconus, Puerco: Cope, 82t  
 Hemiganus, Puerco beds: Cope, 82za, 85o  
 Invertebrata: Meek, 70d; White (C A), 74  
 Kritosaurus, new dinosaur: Brown (B), 10  
 Lemuroids, Puerco formation: Cope, 84n  
 Lime Creek fauna of Iowa at Lake Valley:  
 Keyes, 06h  
 Limnoscelis: Williston, 12a  
 Loup Fork fauna: Cope, 77  
 Mammalia, Eocene: Cope, 81s, 82; Santa Fe  
 marls: Cope, 74m  
 Manzano group, Rio Grande valley: Girty, 09c  
 Mastodon: Cope, 75j; Leidy, 72g  
 Mississippian, Lake Valley district: Miller  
 (S A), 81f  
 Mount Taylor region: Shimer, 08a  
 Nothodectes, San Juan Basin: Matthew (W D),  
 17c  
 Pantolambda, Puerco: Cope, 82t  
 Permian: Cope, 81z  
 Amphibia: Case, 11a  
 Reptilia: Cope, 78y; Williston, 11b, 15b  
 vertebrates: Williston, 11  
 Permo-Carboniferous vertebrates: Case, 13a  
 Physa, Las Vegas. Springer, 02  
 Pinna, Cretaceous: White (C A), 81c  
 Plagiaulacidae, Puerco beds: Cope, 86n  
 Plantae: Newberry, 83f  
 Psittacotherium, Puerco beds: Cope, 87e

## New Mexico—Continued.

*Paleontology*—Continued.

- Puerco and Torrejon faunas: Gardner (J H), 10e  
 Puerco fauna: Cope, 82zc, 83b, n, za, zf, 84d,  
 85m, 88d, t; Matthew (W D), 97a; Os-  
 born, 95; marsupials: Cope, 82y, 85p;  
 ungulates: Earle, 93b  
 Pythonomorpha, Cretaceous: Cope, 71h  
 Reptilia: Marsh, 78b; Triassic: Huene, 15  
 Rhinoceros: Cope, 84k  
 Ruminant, Pleistocene: Gidley, 06c  
 San Juan Basin, Mammalia: Granger, 17  
 San Juan Co., flora of Fruitland and Kirtland  
 formations: Knowlton, 16a  
 Nonmarine Cretaceous Invertebrata: Stanton,  
 16  
 Vertebrata: Gilmore, 16  
 Snails: Cockerell, 05a  
 Sphenacodon: Williston, 16c  
 Stenofiber: Cope, 75j  
 Tertiary Mollusca: Cockerell, 14  
 Plantae: Fontaine, 90; Lesquereux, 72  
 Triassic Reptilia: Mehl, 15b  
 Triisodon, Eocene: Cope, 81q, 83f  
 Tucumcari: Hill (R T), 93h; Marcou, 93c  
 Turtles, new species: Hay (O P), 10c  
 Vermejo and Raton floras: Knowlton, 17  
 Vertebrata: Cope, 74d, 75c  
 Wasatch Mammalia: Cope, 76  
 Wasatch fauna: Matthew (W D), 15a  
 Zalambdodont insectivore, Eocene: Matthew  
 (W D), 13b

*Petrology*.

- Analcite camptonite: Ogilvie, 02a  
 Burro Mountains: Somers, 15  
 Cerrillos Hills: Johnson (D W), 03  
 Eocene formations, Rocky Mountains, petro-  
 graphic characters: Johannsen, 14a  
 General: Lindgren, 10; Loew, 75, 75a  
 Luna Co.: Darton, 16  
 Northern N. Mex.: Conkling, 77a  
 Ortiz Mountains: Ogilvie, 08  
 Pyroxenic rock, Gila River: Merrill (G P),  
 92a  
 Tewan Mountains, volcanic rocks: Iddings, 90  
 United States-Mexico boundary: Lord, 99

*Physical geology*.

- Arid erosion, measure of: Keyes, 15m  
 Arid regions, geologic processes: Keyes, 09a  
 Boulders in gravel deposits: Rich, 14b  
 Caballo Mountains: Allen (C A), 11; Clifford,  
 11; Larsh, 11  
 Coal fields, structural features: Kirk, 15  
 Concretions, physical origin: Gardner (J H), 08  
 Earthquakes, Socorro: Bagg, 04a  
 in 1906 and 1907: Reid (H F), 11b  
 Estancia Plains, geotectonics: Keyes, 08b  
 Faulting, Luna Co.: Darton, 14c  
 Jornada del Muerto, structure: Keyes, 05h  
 Landslide, Chaco Canyon: Dodge, 02  
 Lava flow, recent: Tarr, 91a  
 Limestone breccias, origin: Campbell (M R), 08  
 Mountain structure: Herrick, 04c  
 Mud and lava deposits: Cope, 82m  
 Plication, Coal Measures, northeastern N. Mex.:  
 Van Diest, 90a



## New Mexico—Continued.

*Physical geology*—Continued.

Raton coal field, metamorphosed coal: Lee (W T), 09c

Sierra del Oro, northern N. Mex.: Keyes, 18d

Stream trenching, Silver City quadrangle: Rich, 11a

Vein, recent, at Ojo Caliente: Lindgren, 08e

Volcanic cones: Marcou, 97b

Volcanoes, extinct: Lee (W T), 12c

*Physiographic geology*.

Afton craters: Lee (W T), 07d

Aggraded terraces of the Rio Grande: Keyes, 07b

Albuquerque region: Herrick, 00b

Arid region, formations: Keyes, 09a

Base-level of eolian erosion: Keyes, 09e

Block mountains: Johnson (D W), 03a; Keyes, 04

Bolson plains: Keyes, 03a, 04a

Canyons, northeastern N. Mex.: Lee (W T), 03

Clinoplains, Rio Grande: Herrick, 04a

Deming quadrangle: Darton, 17

Drainage systems: Tarr, 90a

Eastern N. Mex.: Hill (R T), 92

Ephemeral lakes: Keyes, 03b

Estancia Plains: Keyes, 08b

Explosion craters: Darton, 16b

Gallina quadrangle: Case, 12b

General: Dutton, 84d; Gilbert, 75a; Hill (R T), 91d; Howell (E E), 91d; Huntington, 14; Jewett, 05; Keyes, 14f

Glaciation: Stone (G H), 01a

Gravel plains: Rich, 11

High Plains: Johnson (W D), 01

Intermont Plains: Keyes, 08a

Jornada del Muerto, structure: Keyes, 05h

Lake basins of Mexican tableland, eolian origin: Keyes, 08e

Las Animas Glacier: Stone (G H), 93a

Luna Co.: Darton, 16

Mesa de Maya, physiographic significance: Keyes, 07c

Mountain blocks, bisection: Keyes, 05g

Mountain structure: Herrick, 04c

Mount Taylor: Dutton, 85; volcanic necks: Johnson (D W), 07a

Navajo country: Gregory (H E), 16a, 17

Northeastern N. Mex.: Lee (W T), 12c; St. John, 76

Northern N. Mex.: Stevenson, 81, 81b

Origin of certain depressions in the Sandias: Reagan, 09a

Ortiz Mountains: Ogilvie, 05a

Otero salt basin: Herrick, 04b

Pecos Valley: Lee (W T), 06c

Physiographic features: Johnson (D W), 06b; Keyes, 06g

Re-eroded channel way: Stevenson, 81b

Santa Fe peneplain: Campbell (M R), 06

Silver City quadrangle: Paige, 12a, 16; Rich, 11a

Southern N. Mex.: Fairbanks, 03

Southwestern N. Mex.: Schwennesen, 18

Stream trenching: Rich, 11a

Tertiary peneplain: Robinson (H H), 07

Toyalané and Lucero: Keyes, 12b

## New Mexico—Continued.

*Physiographic geology*—Continued.

Tularosa Basin: Meinzer, 15

Valencia Co.: Johnson (D W), 02

Volcanic craters: Keyes, 07

Volcanoes, extinct: Hill (R T), 97b

White sands region: Herrick, 00c

Zuñi Plateau: Dutton, 85

Zuñi salt lake: Darton, 05h

*Underground water*.

Animas, Playas, Hachita, and San Luis basins: Schwennesen, 18

Artesian water: Carpenter (L G), 90a

Deming quadrangle: Darton, 17

Eastern N. Mex.: Hill (R T), 93; Van Diest, 90

Estancia Valley: Meinzer, 10, 11

Hot springs, Ojo Caliente: Lindgren, 10a

Jemez Plateau, springs: Kelly, 13

Jornada del Muerto: Keyes, 05

Luna Co.: Darton, 14a

Navajo country: Gregory (H E), 16a

Northwestern N. Mex.: Darton, 10a

Rio Grande Valley: Lee (W T), 07b

Roswell area: Fisher (C A), 06b

San Simon Valley: Schwennesen, 17

Silver City quadrangle: Paige, 16

Tularosa Basin: Meinzer, 15

New Red Sandstone, age: Rogers (W B), 55

New Westminster district, B. C.: LeRoy, 06

New World district, Mont.: Gardner (E D), 14

New York.

Adirondack region: Newland, 08

Agricultural geology: Emmons (E), 45

Au Sable region: Hall, 78d

Bibliography, 1876-1893: Clarke (J M), 94c

Boulders, Orange Co.: Lesley, 60

Buffalo: Hayes (G E), 69; Martin (D S), 02

Catskill aqueduct: Berkey, 11, 17a

Catskill Mountains: Pierce, 23; Dwight (H E), 20; Hall, 78b

Cattaraugus Co.: Horsford, 40

Central N. Y.: Conrad, 37

Coal at Kreisherville: Hollick, 08a

Congregations, Columbia Co.: Grant (W H), 51

Current action in Ordovician: Ruedemann, 97a

Director of science, reports: Clarke (J M), 06, 06a, 07d, 08, 09, 10, 11, 12, 13, 14, 15, 16

Drift boulder with magnetite: Hollick, 06e

Elizabethtown, Essex Co.: Kellogg, 49

Eozoon: Edwards (A M), 70b

Erie Canal: Eaton (A), 24

Erie Co.: Pohlman, 84

Essex Co.: Emmons (E), 38

First geological district: Mather, 37, 38c

Flagstones: Stevens (R P), 74

Fourth district, geological survey: Hall, 38, 41

General: Akerly, 14b; Beck, 40; Callaway, 78a; Clarke (J M), 14; Dewey, 37; Eaton (A), 30e; Emmons (S F), 93; Gordon (T F), 36; Hubbard (O P), 37; Mitchell, 98, 14; Morse (J O), 30; Redfield, 38

Geologic map, preparation: McGee, 96d

Geological maps: Leighton, 09

Geological survey: Emmons (E), 43; Hall, 43a, 44a, 83c; report: Clarke (J M), 18

Highlands: Eaton (A), 22b; Pierce, 22

Hudson River, fault control: Berkey, 13b; geology: Kunz, 13



## New York—Continued.

- Hudson Valley: Akerly, 20  
 Index to publications: Ellis (Mary), 03  
 Inliers, types of: Ruedemann, 09  
 John Boyd Thacher Park: Kunz, 14, 15  
 Lake Champlain: Clarke (J M), 07a  
 Lester Park: Clarke (J M), 14b  
 Letchworth Park: Grabau, 07j  
 Long Island: Akerly, 14a; Hollick, 93; Mitchell, 14c,e  
 Madison Co.: Lincklaen, 45  
 Manhattan Island: Cozzens, 43; Hobbs, 03f; Martin (D S), 76; geologic history: Newberry, 78e  
 Maps of State: Hall, 93a  
 Niagara Falls: Robertson (F), 05  
   interruption in flow: Spencer (J W), 1 0a  
   spoliation: Spencer (J W), 08h  
 Niagara Falls region: Hall, 43k  
 New York City, stability of rock foundations: Julien, 07b  
 New York Island, geologic history, Newberry, 78e  
 Northern N. Y.: Emmons (E), 37  
 Onondaga Co.: Emmons (E), 46a; Knapp, 88  
 Ontario Valley: Geddes, 26  
 Orange Co.: Arnell, 09  
 Palisades: Hoppock, 82  
 Passaic quadrangle: Darton, 08b  
 Peat, Staten Island: Hollick, 04b  
 Portage Dam site: Grabau, 09g  
 Preglacial channels of lower Hudson Valley; Berkey, 06a  
 Putnam Co.: Blake (W P), 49  
 Renssaeler Co.: Eaton (A), 22, 23  
 St. Lawrence Co.: Emmons (E), 38; Finch (J), 31  
 Saratoga Co.: Steel, 23  
 Saratoga regions: Steel, 25, 25a  
 Schoharie Co.: Sias, 04  
 Second district, geological survey: Emmons (E), 39, 41  
 Silver Lake basin, Staten Island: Hollick, 16a  
 Soils: Emmons (E), 46  
   Oneida Co.: Maxon, 15  
   Orange Co.: Crabb, 14  
 Report of State geologist: Clarke (J M), 99b, 06a; Hall, 83, 84a,c, 85a,e, 86, 86d, 87a, 88b, 89, 90, 91, 92, 93a, 94, 95, 97, 97b,c, 99, 99a; Merrill (F J H), 01, 02a, 03, 04, 04a  
 Southeastern N. Y.: Eights, 36; Mather, 37, 38c; Pierce, 20  
 Staten Island: Britton (N L), 86c; Hollick, 99f, 10; Pierce, 18  
 Third district, geological survey: Conrad, 37; Vanuxem, 39, 41  
 Troy: Hale, 21  
 Vassar College region: Shattuck, 07b  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 Western N. Y.: Vanuxem, 37

*Economic geology.*

- Abrasives: Magnus, 05  
 Albany Co.: Nason, 94  
 Albany molding sand: Newland, 16b

## New York—Continued.

*Economic geology—Continued.*

- Albany slip clay: Jones (R W), 16  
 Arsenic, Putnam Co.: Judd, 08  
 Bluestone: Dickinson, 03; Ingram, 94; Ashokan dam: Berkey, 08  
 Broadalbin quadrangle, Fulton-Saratoga cos.: Miller (W J), 11b  
 Building stone: Clarke (J M), 12; Eckel, 13; Hall, 86c; Hawes, 84; McCourt, 06; Smock, 88, 90  
 Cement: Eckel, 01; Ries, 01a  
 Clay: Ries, 93, 95, 00b  
   Cretaceous, Long Island: Ries, 94  
   Hudson Valley: Jones (C C), 00; Ries, 91, 91b  
   Staten Island: Hollick, 92e  
 Copper deposits: Weed, 11  
 Diatomaceous earth, Adirondacks: Cox (C F), 93, 94  
 Emery, Westchester Co.: Eckel, 01b; Nevius, 01a  
 Erie Co.: Bishop, 97  
 Essex Co., Mineville: Ries, 04b  
 Feldspar deposits: Bastin, 07a, 10; Watts (A S), 16  
 Fire sand, Clinton Co.: Brainerd, 86  
 First geological district: Mather, 39a, 40, 41a  
 Fourth geological district: Hall, 39  
 Garnet deposits, Warren Co.: Miller (W J), 12, 13a  
 General: Beck, 37, 39, 40a, 41, 42; Emmons (E), 42b, 46d; Merrill (F J H), 98c; N Y St Mus, 04  
 Gneiss: Newland, 16  
 Gold: Nevius, 00a  
 Granite: Newland, 16  
 Graphite: Jones (R W), 16a; Kemp, 00; Mills, (F S), 08  
   Adirondack Mountains: Alling, 17; Bastin, 10a; Kemp, 04  
   Ticonderoga: Bastin, 10a; Clinton, 30; Julien, 83b  
   Tuxedo Park: Bayley, 08; Stewart (C A), 08a  
 Gypsum: Dewey, 45; Eckel, 04; Hunt, 49a; Merrill (F J H), 93; Newland, 10; Parsons (A L), 02a, 04, 05a; Cayuga Co.: Williams (S G), 85  
 Hudson Valley: Dale, 04a  
 Hydraulic lime: Wright (B), 21  
 Iron: Beck, 37, 38; Emmons (E), 40; Hall, 37; Mills (F S), 08; Norton, 10; Putnam, 86; Smock, 89, 89a; Whitney, 56a  
   Adirondack Mountains: Nason, 93a; Newland, 07a,b, 08  
   Antwerp and Fowler hematites: Crosby, 01a  
 Brewster district: Koeberlin, 09  
 central N. Y.: Chester, 81  
 Clinton ore: Higgins, 08; Newland, 08a, 09; Smyth (C H), 92a, 11a  
 Clintonville: Emmons (E), 47b  
 Columbia Co.: Raymond, 76  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Essex Co.: Kemp, 95, 95g, 97; Watson (W C), 53  
 Forest of Dean iron mine: Stoltz, 08



## New York—Continued.

*Economic geology*—Continued.

- Iron: hematite, eastern N. Y.: Eckel, 04i, 05c;  
St. Lawrence Co.: Brinsmade, 06  
limonite, Cornwall: Hartnagel, 05a; Staten  
Island: Fettke, 12; Gratacap, 99c  
Lyon Mountain: Newland, 06  
magnetites, Adirondacks: Newland, 07, 07a,  
08; St. Clair, 14a; Sjögren, 91  
Mineville: Granberry, 06; Ries, 03b, 04b  
Mineville-Port Henry mine group: Kemp,  
08a  
Port Henry: Birkinbine, 90; Kemp, 98a  
Cheever mines: Stoltz, 11  
Putnam Co.: Landis, 00; Ruttman, 87;  
Wendt, 85; Stewart (C A), 08  
St. Lawrence Co.: Brinsmade, 06; Hunt,  
73a; Silliman (jr), 73c; Smyth (C H), 94  
New Springville, Staten Island: Hollick, 96d;  
northern N. Y.: Cozzens, 25; Hall (C E), 79,  
85a; Hough, 51a; McDonald (P B), 13  
Ontario mine: Taylor (C F), 12  
Penn Yan, Yates Co.: Clemson, 35a  
St. Lawrence and Jefferson cos.: Smyth  
(C H), 94  
Salisbury district: Hobbs, 07d  
siderite, Columbia Co.: Kimball, 90  
Staten Island: Jackson, 65a  
titaniferous, Adirondacks: Kemp, 95h, 99b  
Ithaca region: Ries, 04a  
Jefferson Co.: Minthorn, 87  
Kersantite: Newberry, 87  
Lead, Ancram: Lee (C A), 24  
St. Lawrence Co.: Smyth (C H), 03; Rossie:  
Macfarlane, 65  
Ulster: Hodge (J T), 54  
Lewis Co.: Hough, 47  
Lime: Ries, 01a  
Limestone: Emmons (E), 47; Ries, 99  
central N. Y.: Schneider, 97a  
eastern N. Y.: Ries, 96  
Manganese: Harder, 10  
Marble: Newland, 16  
Marl and peat deposit, New Baltimore: Mar-  
shall (W B), 92  
Mineral resources: Emmons (E), 46d; Merrill  
(F J H), 94a, 95  
Mineral springs: Beck, 38  
Mining and quarry industry: Newland, 05  
Molding sand: Eckel, 03f; Albany: Newland,  
15, 15a  
Monroe Co.: Hall, 38; Sarle, 04  
Natural gas: Ashburner, 87c, 88; Orton, 99a  
Buffalo region: Ashburner, 89a  
central N. Y.: Prosser, 88  
West Bloomfield: Wurtz, 71a  
western N. Y.: Bishop, 99, 01  
Niagara Co.: Hall, 38  
North Creek quadrangle, Warren Co.: Miller  
(W J), 14a  
Northern N. Y.: Emmons (E), 42  
Oil, Allegany Co.: Silliman, 32  
Oneida Co.: Smyth (C H), 04  
Onondaga Co.: Hopkins (T C), 04; Luther, 97a  
Orange Co.: Horton, 39; Ries, 97b  
Orleans Co.: Boyd (G W), 38  
Peat: Parsons (A L), 05; Ries, 03a; Dutchess  
Co.: Schaffer, 18

## New York—Continued.

*Economic geology*—Continued.

- Petroleum: Ashburner, 86g, 88; Fuller, 17;  
Orton, 99a; Rogers (H D), 60; Van Ingen,  
95; Wrigley, 82  
Allegheny sands: Ashburner, 83c  
western N. Y.: Bishop, 99, 01  
Phosphate, Crown Point: Wells, 50a  
Portland-cement resources: Eckel, 05f  
Pyrite, Adirondacks: Eckel, 05g  
Jefferson and St. Lawrence Cos.: Budding-  
ton, 17  
northern N. Y.: Newland, 17b  
St. Lawrence Co.: Smyth (C H), 12  
Pyrrhotite, Anthony's Nose, Peekskill: Kemp,  
95c  
Jefferson and St. Lawrence cos.: Budding-  
ton, 17  
Quarry materials: Newland, 16  
Quarry rocks, southeastern N. Y.: Eckel, 02  
Quartz deposits: Bastin, 07a  
Road materials: Merrill (F J H), 97  
Rossie, St. Lawrence Co.: Macfarlane, 65  
St. Lawrence Co.: Logan, 04  
Salt: Beck, 38; Englehardt, 83; Luther, 99;  
Merrill (F J H), 93; Newberry, 85i; Van-  
uxem, 41  
central New York: Bishop, 92  
Livingston Co.: Wright (G F), 86  
Onondaga Co.: Geddes, 60; Luther, 97a  
Watkins Glen district: Kindle, 05  
western N. Y.: Bishop, 86; Newberry, 87b,  
89c  
Wyoming, rock salt: Macfarlane, 78  
Salt springs: Eaton (A), 23b  
Second geological district: Emmons (E), 39, 40  
Shale, Devonian: Ries, 97c; physical tests:  
Ries, 98  
Slate: Dale, 06c; Washington Co.: Nevius, 01  
Slate and stone: Leighton, 10  
Sulphur, Peekskill district: Lovemann, 11  
Talc: Perrenoud, 86  
northern N. Y.: Brinsmade, 05; McDonald  
(P B), 13  
St. Lawrence Co.: Nevius, 99, 99b; Sahlin, 93;  
Smyth (C H), 97; genesis: Smyth (C H),  
96b  
Third geological district: Carr, 40; Vanuxem, 38  
Thousand Islands region: Cushing, 10a  
Trap: Newland, 16  
Ulster Co.: Nason, 94a  
Watkins Glen district: Kindle, 05  
Watkins Glen-Catatonk district: Williams (H  
S), 90  
Washington Co.: Fitch, 50  
Wayne Co.: Boyd (G W), 38  
Western N. Y.: Bishop, 04  
Whetstone, Onondaga Co.: Schneider, 03  
Zinc, Edwards district, St. Lawrence Co.:  
Hatmaker, 16; Newland, 06b, 16c, 17a;  
Smyth (C H), 18

*Historical geology.*

- Adirondack anorthosite: Miller (W J), 18a  
Adirondack graphite deposits: Alling, 17  
Adirondack Mountains: Hyatt, 68c; Kemp, 92f,  
00c, 14b; Miller (W J), 17a; Smyth (C H),  
99b



## New York—Continued.

*Historical geology—Continued.*

- Adirondack Mountains; eastern, crystalline rocks: Kemp, 99  
 dikes, pre-Cambrian and post-Ordovician: Cushing, 96a  
 igneous rocks, age: Cushing, 15a  
 north of, Potsdam boundary: Cushing, 99  
 northern: Cushing, 99a, 05a  
 physiography in Cambrian and Ordovician: Kemp, 97b  
 schistose rocks: Britton (N L), 85c  
 southern: Kemp, 99a; Paleozoic physiography: Miller (W J), 13  
 western, crystalline rocks: Smyth (C H), 99, 99a
- Albany Co.: Darton, 94a; Eaton (A), 20; Nason, 94; geologic map: Darton, 97a
- Alluvial deposits, Mohawk River: Tomlinson, 32
- Anorthosite body in Adirondacks: Bowen (N L), 17b; Cushing, 17
- Archean, southeastern N. Y.: Britton (N L), 87a
- Asymmetric differentiation in a syenite batholith: Cushing, 07a
- Attica quadrangle: Luther, 14
- Auburn-Genoa quadrangle: Luther, 10
- Barnegat limestone, Newburg: Whitfield, 79
- Becraft Mountain, Columbia Co.: Davis (W M), 83c; Grabau, 03, 03d, 04b
- Beekmantown, Champlain Valley: Brainerd, 90a
- Block Island: Hollick, 98
- Blue Mountain quadrangle: Miller (W J), 17
- Bluestone near Ashokan dam: Berkey, 08
- Borings: Ashburner, 88  
 Alloway well: Prosser, 00d  
 central N. Y.: Prosser, 88  
 Ithaca: Tarr, 04b  
 Long Island: Bryson, 88a  
 Mohawk Valley: Prosser, 00c  
 Morrisville, Madison Co.: Prosser, 88a  
 Onondaga region: Englehardt, 83  
 Staten Island: Camacho, 97; Hollick, 99e, 04a  
 Utica: Walcott, 88b  
 Woodhaven, Long Island: Bryson, 89
- Boulder pavement, Wilson: Gilbert, 98b
- Boulders, Staten Island: Gratacap, 99b
- Brewster iron-bearing district: Koeberlin, 09
- Broadalbin quadrangle, Fulton-Saratoga cos.: Miller (W J), 11b
- Buffalo: Ashburner, 89a; Martin (D S), 02; Pohlman, 89
- Buffalo quadrangle: Luther, 06
- Calceiferous, Champlain Valley: Brainerd, 90  
 Mohawk Valley: Cleland, 00, 03
- Cambrian, eastern N. Y.: Ruedemann, 03  
 Granville district, Washington Co.: Walcott, 87c  
 Saratoga: Walcott, 84d  
 Troy: Ford (S W), 71a; Martin (D S), 73
- Cambrian and Ordovician outliers, Adirondacks: Kemp, 96f
- Cambro-Ordovician outlier, Wellstown, Hamilton Co.: Kemp, 01c, 02c
- Cambro-Silurian oscillations: Cushing, 07c
- Canaan Mountain: Barnes, 22

## New York—Continued.

*Historical geology—Continued.*

- Canandaigua quadrangle: Clarke (J M), 04b
- Canton quadrangle, pre-Cambrian rocks: Martin (J C), 16
- Carboniferous, southwestern N. Y.: Glenn, 03
- Castoroides, Clyde, geological horizon: Hall, 46
- Cataract formation: Schuchert, 13f, 14a
- Catskill formation: Fuller, 02c
- Catskill group: Hall, 62m, 64a; Prosser, 91; Delaware Co.; Jewett, 62
- Catskill Range: Barton, 22; Hall, 76c; Sanborn, 08
- Cattaraugus Co.: Horsford, 40; Randall, 94
- Cayuga and Onondaga cos.: Taber (S), 18
- Cayuga Co., gypsum deposits: Williams (S G), 85
- Cayuga Lake section: Williams (H S), 86b
- Cayugan waterlimes, western N. Y.: Chadwick, 17c
- Cement rock, Buffalo: Pohlman, 89
- Central N. Y.: Clarke (J M), 97; Conrad, 37
- Champlain basin, paleogeography: Ruedemann, 07
- Champlain Valley: Van Ingen, 96; Walcott, 83d
- Chautauqua Co.: Randall, 94
- Chazy formation: Brainerd, 88, 91, 96; Raymond (P E), 06
- Chemung (base): Williams (H S), 83
- Chemung group: Hall, 85f
- Chemung series: Prosser, 99
- Chenango Co.: Clarke (J M), 94b
- Classification of formations: Clarke (J M), 03g; Hartnagel, 12
- Clay beds, Newburgh: Dwight, 85
- Clays, near Morrisania: Martin (D S), 89a; Merrill (F J H), 89
- Cliff Haven: Hudson, 18
- Clinton and Niagara, western N. Y.: Sarle, 01
- Clinton Co.: Cushing, 94, 97; Rand Hill: Cushing, 01
- Clinton formation: Chadwick, 18; Newland, 08a
- Clyde: Hall, 46a
- Coastal Plain formations: Clark (W B), 09a
- Cobbleskill limestone: Hartnagel, 03
- Columbia Co.: Bishop (I P), 86a, 87; Ford (S W), 84; Oriskany: Beecher, 92
- Corniferous lime rock: Eaton (A), 39
- Cornwall limonite beds: Hartnagel, 07c
- Cortlandt and Stony Point rocks: Dana (J D), 84b
- Cortlandt series, near Peekskill: Berkey, 08c; Rogers (G S), 11a; Williams (G H), 88d.
- Cretaceous, Long Island: Dana (J D), 73g; Hitchcock (C H), 74f; Hollick, 93a, 94i, 95e, 96b, c; Pollard, 94; Martin (D S), 74a; Newberry, 74s
- Staten Island: Britton (N L), 85, 85a, 89; Hollick, 92b, 98b
- Croton aqueduct: Carson, 91
- Croton Point: Warring, 87a
- Crown Point section, Essex Co.: Raymond (P E), 02
- Crystallines of southeastern N. Y.: Berkey, 09b
- Cuboides zone: Williams (H S), 90
- Depew quadrangle: Luther, 14



## New York—Continued.

*Historical geology*—Continued.

- Devonian: Hall, 70; Williams (H S), 82b, 83b, 84, 87  
 Catskill Mountains: Sherwood, 78a  
 Cayuga Lake: Williams (H S), 80a  
 central N. Y.: Prosser, 97; Smith (B), 16  
 eastern N. Y.: Prosser, 95, 97  
 Genesee and Wyoming cos.: Williams (H S), 84d  
 Ontario Co.: Clarke (J M), 85a  
 southeastern N. Y.: Hall, 80a  
 southwestern N. Y.: Glenn, 03  
 Unadilla River: Prosser, 93  
 Upper: Barrell, 13a; classification: Williams (H S), 86  
 western N. Y.: Clarke (J M), 91e; Hussakof, 18; Williams (H S), 81  
 Devonian and Silurian, central N. Y.: Prosser, 93a; western central New York: Prosser, 90, 92d  
 Devonian history: Clarke (J M), 08b  
 Dikes, Hudson River Highlands: Kemp, 88c  
 Ithaca: Barnett, 05; Schneider, 03c  
 Syracuse: Darton, 95; Schneider, 03b  
 Dutchess Co.: Akerly, 14; Dwight, 89; Gordon (C E), 09; Merrill, 05a  
 Eastern N. Y.: Clarke (J M), 09a; Dale, 96; Darton, 97; Dewey, 24; Ford (S W), 80a; Hall, 64d; Prosser, 03a  
 Edwards district, Adirondack region: Newland, 16c, 17a  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Elmira quadrangle: Clarke (J M), 05b  
 Eozoonal rock, Manhattan Island: Gratacap, 87  
 Erie Canal: Eaton (A), 24  
 Erie Co.: Bishop (I P), 97; Grabau, 98a; Houghton (F), 14; Pohlman, 84  
 Essex Co.: Hall (C E), 85a; Kemp, 94, 95, 97; Watson (W C), 53; Minerva: Finlay (G I), 02a  
 Essex and Willsboro townships: White (T G), 94  
 First geological district: Mather, 37, 39a, 40, 41a, 43  
 Fishers Island: Fuller, 05r  
 Fordham gneiss, interbedded limestones: Berkeley, 08d  
 Fort Cassin beds (Calciferous): Whitfield, 90c; Dutchess Co.: Dwight, 01  
 Fourth geological district: Hall, 38, 39, 40, 41, 43; Vanuxem, 37  
 Frankfort and Utica shales, Mohawk Valley: Ruedemann, 11  
 Franklin Co.: Cushing, 99, 99a, 02  
 General: Akerly, 14b; Bigsby, 29a, 58; Brown (T C), 06; Clarke (J M), 99d, 14, 15; Conrad, 41; Eaton (A), 28, 30d, 32; Eights, 35; Emmons (E), 42b, 46, 47a; Grabau, 05; Hall, 43c, 44a, 45b, 52d, 62l, 86; Lincklaen, 61; Merrill (F J H), 98c; Thomas (D), 31; Ward & Howell, 78b; Weeks, 05  
 Genesee River: Bigsby, 20  
 Genesee section: Prosser, 92d; Williams (H S), 87  
 Geneva-Ovid quadrangles: Luther, 09

## New York—Continued.

*Historical geology*—Continued.

- Geologic formative, nomenclature: Clarke (J M), 04a  
 Geologic history: Miller (W J), 14  
 Geologic map: Hitchcock (C H), 70d; McGee, 94b; Moreau, 4a; Merrill (F J H), 02b; N Y G S, 42; (explanation): Hall, 93b  
 Glens Falls, Ordovician: White (T G), 00a  
 Gouverneur: Smyth (C H), 93b  
 Gouverneur quadrangle: Cushing, 18  
 Graptolite beds, Rensselaer Co.: Ruedemann, 02  
 Graptolite zones of Utica shale: Ruedemann, 17  
 Guelph dolomite: Clarke (J M), 03f  
 Guelph formation, Rochester: Arey, 93  
 Hamilton formation: Cleland, 03a; Prosser, 93b, 99  
 Chenango and Otsego cos.: Prosser, 88b  
 Eighteenmile Creek: Grabau, 96a  
 western N. Y.: Grabau, 15b  
 Helderberg escarpment, Albany Co.: Darton, 14b  
 Helderberg front: Grabau, 12c  
 Helderberg limestones, east of Catskills: Davis (W M), 83a; eastern N. Y.: Darton, 94  
 Helderberg Plateau, northern end: Prosser, 00  
 Helderbergs, eastern: Prosser, 99a  
 Hempstead plains, Long Island, drift deposits: Bryson, 97  
 Highlands: Mather, 31  
 basal gneisses: Berkeley, 06  
 structure: Berkeley, 12b  
 Honeoye-Wayland quadrangle: Luther, 11  
 Hudson Gorge at New York City: Rogers (G S), 10  
 Hudson River beds, Albany region: Ruedemann, 01  
 Hudson Valley: Akerly, 20; Dale, 04a; Hovey, 12f; Rogers (H D), 41a  
 Indian Ladder section: Prosser (C S), 07  
 Intrusives in Inwood limestone, Manhattan Island: Eckel, 99  
 Ithaca region: Kindle, 96; Simonds, 77  
 Ithaca section: Williams (H S), 06  
 Jefferson Co.: Minthorn, 87; Smyth (C H), 94  
 Kreischerville clays, Staten Island, age: Gratacap, 00b  
 Lake Bonaparte quadrangle: Buddington, 18  
 Lake Placid quadrangle: Miller (W J), 18  
 Lake Placid region: Kemp, 98  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Lewis Co.: Hough, 47  
 Limestone beds, New York City: Martin (D S), 71  
 Little Falls dolomite of Mohawk Valley: Ulrich, 10a  
 Little Falls quadrangle: Cushing, 05  
 Little Mountains, Greene Co.: Davis (W M), 82c  
 Lockport: Henwood, 42  
 Lockport-Guelph section, Rochester: Chadwick, 17b  
 Livingston and Genesee cos.: Green (H A), 66  
 Livingston Co.: Wright (G F), 86  
 Livonia salt shaft: Hall, 92, 94a; Luther, 94



## New York—Continued.

*Historical geology—Continued.*

- Long Island: Bryson, 94; Crosby, 00a, 08; Dana (J D), 87d; Fuller, 03h, 14; Hollick, 94e, 96c; Merrill (F J H), 86; Veatch, 03a, 06c; Watson (W C), 60; Rock Hill: Bryson, 95a; Woodham artesian well: Lewis (E), 89
- Long Lake quadrangle: Cushing, 07
- Lorraine, Foerste, 14a
- Lower Helderberg formation: Calloway, 78; Schuchert, 00a; Williams (S G), 86a
- Cayuga Lake: Williams (S G), 87
- Port Jervis: Barrett, 76a
- Lower Silurian horizons: Ulrich, 88a
- Madison Co.: Evans (G), 52; Lincklaen, 45
- Magothy formation on Atlantic islands: Bibbins, 10
- Manhattan Island: Berkey, 09, 15; Cozzens, 43; Gale, 43; Hobbs, 05; Kemp, 87; Stevens (R P), 65
- lithology: Friedrich, 89b
- metamorphic rocks, age: Britton (N L), 81
- river channels: Hobbs, 02e
- Manhattan schist: Fettke, 14
- Manlius formation: Schuchert, 03b
- Marcellus limestones: Clarke (J M), 01
- Marcellus (Stafford) limestones, Erie Co.: Wood (Elvira), 01
- Marine shells in drift: Redfield, 47
- Marl and peat deposit, New Baltimore, Greene Co.: Marshall (W B), 92
- Medina formation: Jewett, 64; Schuchert, 14a
- Medina sandstone: Grabau, 07g; Kindle, 14f
- Metamorphic strata, southeastern N. Y.: Merrill (F J H), 90
- Minnewaska region: James (F W), 05
- Mohawk Valley: Beecher, 86a; Darton, 94c, 97; Prosser, 00a
- Monroe Co.: Fairchild, 95f, 96d; Hall, 38
- Montgomery Co.: Cumings, 00
- Mount Bob: Harris (T W), 92
- Naples quadrangle: Clarke (J M), 04b
- Newark group, Rockland Co.: Kümmel, 99a
- Newark rocks: Kümmel, 99b
- New York City: Berkey, 12, 12a; Gratacap, 01; Martin (D S), 98; Merrill (F J H), 97a, 98d
- East River section: Kemp, 95f
- geologic map: Martin (D S), 88
- gneiss outcrop: Ries, 91a
- stability of rock foundations: Julien, 07b
- New York City district: Credner, 65a; Merrill (F J H), 02
- New York Co.: Gale (L D), 39
- New York series, revision: Chadwick, 08
- New York system: Emmons (E), 46e
- Niagara Co.: Alexine, 81; Hall, 38
- Niagara quadrangle: Kindle, 13c
- Niagara region: Bigsby, 29; Grabau, 01; Hall, 42; Lyell, 42b, 43
- Niagara shales: Ringueberg, 88
- Nomenclature of New York series: Clarke (J M), 99i; Cushing, 11
- North Creek quadrangle, Warren Co.: Miller (W J), 14a
- Northeastern N. Y.: Jessup, 21
- Northern N. Y.: Emmons (E), 42, 42a

## New York—Continued.

*Historical geology—Continued.*

- Northumberland volcanic plug, Saratoga Co.: Woodworth, 03
- Oceanic current, Utica epoch: Ruedemann, 98a
- Ogdensburg region: Cushing, 16
- Olean quadrangle: Clarke (J M), 02e
- Olean section: Clarke (J M), 03c
- Oneida conglomerate: Grabau, 05a; Hartnagel, 07; Jewett, 64
- Oneida Co.: Brigham, 89
- Ononta and Chemung, relations: Darton, 93a
- Ononta sandstone: Hall, 92b; Chenango Co.: Hall, 86; Beecher, 86b
- Onondaga Co.: Geddes, 60; Luther, 97a; Schneider, 94
- Onondaga formation: Kindle, 12
- Onondaga salt basin: Smith (V W), 57
- Onondaga salt group, Buffalo: Pohlman, 86a
- Ontaric section of eastern N. Y.: Hartnagel, 06
- Ontario Co.: Clarke (J M), 85b
- Oolite, Edenville, Orange Co.: Young (J P), 31
- Orange Co.: Darton, 85; Denniston, 63; Horton, 39; Ries, 97b; Shepard, 32a
- Cornwall: Dwight, 84a
- Schunemuuk Mountain: Martin (D S), 71a
- Trilobite Mountain: Shimer, 05
- Ordovician: Foerste, 16
- Columbia Co.: Dwight, 87a
- Frankfort region: White (T G), 99
- Mohawk Valley: Prosser, 97a
- Montgomery Co.: Cumings, 00
- Oriskany formation: Clarke (J M), 00f; Schuchert, 00a
- Oriskany sandstone, age: De Cew, 62; Onondaga Co.: Wheelock, 03
- Orleans Co.: Boyd (G W), 38
- Overlook Mountain: Stevens (N E), 12
- Paleozoic section in northwestern N. Y.: Cushing, 08
- Palisades of Hudson River: Kümmel, 00a
- Palisades diabase: Irving, 98
- Palisade trap: Julien, 07
- Paradox Lake quadrangle: Ogilvie, 05
- Passaic quadrangle: Darton, 08b
- Penn Yan-Hammondsport quadrangles: Luther, 06a
- Peridotite dikes, Ithaca: Kemp, 91d
- Phillips pyrites mine near Peekskill: Loveman, 11
- Portage, sections: Hall, 43h
- Portage and Nunda quadrangles: Clarke (J M), 08c
- Portage formation: Luther, 03; Prosser, 93b
- Portage group, Naples Valley: Luther, 97
- Portage region: Clarke (J M), 97e
- Portage sandstones: Luther, 02
- Port Henry region: Hunt, 83d; Kemp, 98a
- Port Jervis: Barrett, 93
- Port Leyden quadrangle, Lewis Co.: Miller (W J), 10
- Potsdam sandstone: Winchell (N H), 93e
- Dutchess Co.: Dwight, 87
- in drift, Tottenville, Staten Island; Gratacap, 90
- Lake Champlain region: Van Ingen, 02
- Poughkeepsie: Dwight, 86a
- Troy: Ford (S W), 73a



## New York—Continued.

*Historical geology*—Continued.

- Poughkeepsie region: Dale, 79; Dwight, 80a, 84b; Finch (J), 26a  
 Cambrian: Dwight, 86  
 Hudson River group: Gerard, 79  
 Poughkeepsie quadrangle: Gordon (C E), 10, 11  
 Pre-Cambrian Adirondacks: Kemp, 00, 11c, 12c  
 correlation: Adams (F D), 07  
 Little Falls, Herkimer Co.: Cushing, 02a  
 northern N. Y.: Hall, 76b  
 Warren, Saratoga, Fulton, and Montgomery cos.: Kemp, 01  
 Renssen quadrangle: Miller (W J), 09  
 Rensselaer Co.: Eaton (A), 22, 23  
 Rensselaer grit plateau: Dale, 93; Ells, 95e  
 Richmond Co.: Britton (N L), 81a  
 Rochester, boring: Fairchild, 91  
 geological history: Fairchild, 94c  
 Pinnacle Hills: Fairchild, 00e  
 Rochester and Ontario Beach quadrangles: Hartnagel, 07b  
 Rockland Co.: Kummel, 99a  
 Rondout area: Barrett, 79; Dale, 79a; Lindsley, 79; Van Ingen, 03  
 Rondout Valley: Berkey, 08b; Ries, 00c  
 Rossie, St. Lawrence Co.: Macfarlane, 65  
 St. Lawrence Co.: Brooks (T B), 72a; Cushing, 99, 02; Smyth (CH), 94; crystalline rocks: Smyth (C H), 97a  
 St. Lawrence Valley: Chadwick, 15; crystalline rocks: Smyth (C H), 01  
 Salina district: Forman, 30  
 Salina group: Newberry, 89c  
 Salt district, western N. Y.: Luther, 99  
 Saratoga Co.: Prosser, 00a; Steel, 23; Northumberland volcanic plug: Cushing, 13  
 Saratoga district: Kemp, 12; Rothpletz, 15  
 Saratoga quadrangle, glacial: Stoller, 16  
 Saratoga Springs: Cushing, 14  
 Schenectady: Ford (S W), 85a  
 Schodack Landing, Rensselaer Co.: Ford (S W), 84a; fault: Ford (S W), 85  
 Schoharie: Gebhard, 35  
 Schoharie Co.: Sherwood, 78a  
 Schoharie section: Stevenson, 00  
 Schoharie Valley: Grabau, 06  
 Schroon Lake quadrangle: Miller (W J), 18  
 Second geological district: Emmons (E), 37, 38, 40, 42  
 Section, Catskill Mountain to Atlantic: Eaton (A), 18  
 Onondaga to Williams College: Eaton (A), 23a  
 Seneca Co.: Delafield, 51; Lincoln, 97  
 Serpentine area, Staten Island: Hollick, 96e; Hunt, 83g  
 Serpentine stock, Staten Island: Crosby, 14  
 Shawangunk conglomerate, Ulster Co.: Brown (T C), 14a  
 Shawangunk grit: Billingsley, 10  
 Shawangunk Mountain, Ulster Co.: Clarke (J M), 07c; Darton, 94h  
 Sherburne bar, significance in Devonian stratigraphy: Grabau, 18a  
 Siderite basins, Columbia Co.: Kimball, 90  
 Silurian: Chadwick, 18a  
 Brockport and Medina quadrangles: Clarke (J M), 02d

## New York—Continued.

*Historical geology*—Continued.

- Silurian: east central N. Y.: Harris, 04b  
 eastern N. Y.: Hartnagel, 05  
 nomenclature and subdivisions: Lane, 09d  
 Orange Co.: Darton, 86  
 southeastern N. Y.: Schuchert, 16a  
 western N. Y.: Hartnagel, 03  
 Siluro-Devonian contact, western N. Y.: Grabau, 98c, 00b  
 Skunnemunk Mountain: Darton, 94f; Hartnagel, 07a; Prosser, 92c  
 Slate belt, eastern N. Y.: Dale, 99  
 Southeastern N. Y.: Berkey, 11; Kemp, 11d; Darton, 94i; Mather, 38c, 43; Merrill (F J H), 90; Shimer, 03; Smock, 86; crystalline rocks: Merrill (F J H), 98  
 South Onondaga: Schneider, 04  
 Southwestern N. Y.: Harris, 91a  
 Stafford limestone: Talbot, 03  
 Staten Island: Britton (N L), 82, 87d, 89b; Gratacap, 99c; Hollick, 94h  
 clay beds: Hollick, 90  
 Yellow Gravel: Britton (N L), 89a  
 Steuben Co.: Denniston, 62  
 Storm King region: Kemp, 12a  
 Summit, Schoharie Co.: Emmons (E), 48  
 Syenite-granite series, Adirondack Mountains: Miller (W J), 18b  
 Syracuse quadrangle: Hopkins (T C), 14  
 Syracuse region: Hopkins (T C), 05  
 Syracuse serpentine: Williams (G H), 90d  
 Taconic, Canaan: Ford (S W), 86  
 Taconic area: Walcott, 88  
 Taconic schists, Hudson River age of: Dana (J D), 79a  
 Taconic stratigraphy: Dana (J D), 85b  
 Taconic system: Emmons (E), 44, 46, 46f; Ford (S W), 80a; geologic age: Dana (J D), 82b  
 Ten Mile River region: Crosby, 00b  
 Tertiary, Long Island: Edwards (A M), 95  
 Third geological district: Conrad, 37; Vanuxem, 38, 39, 40, 42  
 Thousand Islands region: Cushing, 10a  
 Trap dike, Staten Island: Gratacap, 91  
 Trap dikes, Lake Champlain region: Kemp, 93d  
 Trenton, Rysedorph Hill, Rensselaer Co.: Ruedemann, 01a  
 Trenton and Black River formations: Coryell, 16  
 Trenton Falls, Oneida Co.: Renwick, 24; White (T G), 96  
 Trenton rocks, original: White (T G), 96a  
 Trenton section: Raymond (P E), 03  
 Triassic, Staten Island: Hollick, 89a, 06b  
 Triassic sandstone in drift, Staten Island: Hollick, 93f  
 Troy region: Dewey, 20a  
 Tully limestone: Williams (S G), 87a; and Genesee shale, relationship: Grabau, 17  
 Tully quadrangle: Clarke (J M), 05c  
 Type specimens of Paleozoic fossils: Clarke (J M), 03  
 Ulster Co.: Darton, 94b; Nason, 94a  
 Unconformity at base of Onondaga: Kindle, 13b; at Catskill: Chadwick, 13  
 Utica slate: Walcott, 83



## New York—Continued.

*Historical geology*—Continued.

- Vassar College region: Shattuck, 07b  
 Vernon shale: Miller (W J), 10a  
 Wappinger Valley: Dwight, 81, 86, 87  
 Wappinger Valley limestone, Dutchess Co.  
   Dwight, 79, 80, 83  
 Warren quadrangle: Butts, 10  
 Warwick, Orange Co.: Williams (H S), 94a  
 Washington Co.: Fitch, 50  
 Watkins quadrangle: Clarke (J M), 05b  
 Watkins Glen quadrangle: Williams (H S), 04a  
 Watkins Glen-Catatonk district: Williams  
   (H S), 09  
 Wayne Co.: Boyd (G W), 38  
 Well records on Long Island: Veatch (A C), 06d  
 Westchester Co.: Dana (J D), 80d; Merrill  
   (F J H), 05; Scharf, 86  
 Western N. Y.: Hall, 43; Hayes (G E), 37, 38;  
   Lesley, 75a; Thomas (D), 30a; Vanuxem,  
   37  
 Yates Co.: Wright (B H), 84  
 Yellow gravel, distribution: Hollick, 94j

*Mineralogy*.

- Allanite, Mineville, Essex Co.: Ries, 97e  
   West Point: Bergemann, 52  
 Amazon stone, North White Plains: Burr, 15  
 Apatite crystals, Antwerp: Knight (N), 03  
 Asteriated rose quartz: Manchester, 10  
 Augite, Warwick, Orange Co.: Rath, 60  
 Barite, De Kalb: Williams (G H), 84a  
 Bedford, pegmatite veins: Luquer, 96a  
 Beryl crystal, New York City: Ries, 97f  
 Calcites: Whitlock, 10  
   Cayuga Co.: Penfield, 00d  
   green, Glens Falls: Koch (L H), 17  
   Martinsburg: Jackson, 66  
 Calstronbarite: Shepard, 38a  
 Catalog of minerals: Beck, 48; Merrill (F J H),  
   94a; Webster (M H), 24  
 Celestite, Syracuse: Kraus, 04  
 Chalcodite, Jefferson Co.: Shepard, 52b  
 Chondrodite, Brewster: Dana (E S), 75a, b, 76a  
 Chrysoberyl, New York City: Moses, 01  
   Saratoga: Steele, 21; Troost, 24a  
 Clintonite, Amity: Brush, 54  
 Cyrtolite, Bedford: Luquer, 04a  
 Danburite, St. Lawrence Co.: Brush, 80  
 Dumortierite, Harlem: Diller, 89a  
 Eastern N. Y.: Dewey, 24  
 Elizabethtown and Port Henry quadrangles:  
   Kemp, 10c  
 Eupyrchoite, Crown Point: Jackson, 51d, 53c  
 Fluorite, Macomb, St. Lawrence Co.: Kunz, 89b  
 Garnet, New York City: Kunz, 86g; Man-  
   chester, 17  
 Garnets and beryls, New York Island: Stanton  
   (G S), 91  
 General: Beck 39, 40a, 41, 42, 50; Nason, 88;  
   Whitlock, 02, 03, 05, 05a  
 Harlem: Chamberlin (B B), 86  
 Hexagonite, St. Lawrence Co.: Goldsmith, 76a;  
   Koenig, 76e  
 Hornblende, St. Lawrence Co.: Williams (G H),  
   85e, 90c  
 Hortonolite, Orange Co.: Brush, 69; Penfield, 96  
 Houghite, St. Lawrence Co.: Johnson (S W), 51

## New York—Continued.

*Mineralogy*—Continued.

- Jefferson and St. Lawrence cos.: Crawe, 34;  
   Rath, 86e  
 Lanthanite and allanite, Essex Co.: Blake (W P),  
   58b  
 Lederite: Shepard, 40a  
 Localities: Whitlock, 03; New York City:  
   Whitlock, 12  
 Lyon Mountain: Whitlock, 07; calcite: Whit-  
   lock, 07a  
 Manhattan Island: Niven, 95; Broadway: Man-  
   chester, 14  
 Melilite, Mannheim: Smyth (C H), 93a  
 Meteorite, Bethlehem: Shepard, 60; Wells, 60  
   Burlington: Silliman (jr), 44a  
 Cambria: Silliman (jr), 45  
 Mount Morris: Whitlock, 13  
 Rensselaer Co.: Bailey (S C H), 87  
 Scriba, Oswego Co.: Cohen, 92  
 Seneca River, Cayuga Co.: Shepard, 53  
 Waterloo, Seneca Co.: Shepard, 51b, c, 52e  
 Mica: Marx, 26  
 Microcline, Pitcairn: Luquer, 93  
 Minerals: Whitlock, 10a; Tilly Foster mines:  
   Breidenbaugh, 73  
 Muscovite, Kings Bridge: Luquer, 93  
 New York City: Bailey (S C H), 65; Chamber-  
   lin (B B), 85; Darton, 82; Friedrich, 86,  
   87; Hovey, 96b  
   Fort George: Kunz, 87k  
   Washington Heights: Hovey, 95a  
 New York Co.: Chamberlin (B B), 88  
 Northeastern N. Y.: Jessup, 21  
 Orange Co.: Fowler, 25; Shepard, 52d  
 Perofskite, Syracuse: Williams (G H), 87g  
 Phacolite: Alger, 47  
 Phlogopite, Edwards Co.: Berwerth, 77  
 Phosphate of lime, Crown Point: Jackson, 51a  
 Port Henry: Kemp, 90b  
 Pseudomorphs: Beck, 43; Smyth (C H), 97b  
 Pyrite, Kings Bridge: Moses, 93b  
 Pyroxene: Haüy, 12; Vanuxem, 23a; Orange  
   Co.: Williams (G H), 87e  
 Pyroxenes, monoclinic: Ries, 96a  
 Pyrrhotite locality: Smyth, 11  
 Quartz, Ellenville: Chester (A H), 94a; irides-  
   cent, New York City: Scott (G S), 18  
 Rossie, St. Lawrence Co.: Smyth (C H), 96c  
 St. Lawrence Co.: Hough, 51b  
 Salina epoch: Kraus, 04b  
 Serpentine pseudomorphs, Putnam Co.: Dana  
   (J D), 74c  
 Sillimanite and monazite: Silliman (jr), 44  
 Staten Island: Chamberlin (B B), 86a; Hollick,  
   93h, 00  
 Striated magnetite crystal, Mineville: Kemp,  
   91e  
 Strontianite, Schoharie: Shepard, 35b  
 Sundry minerals: Blake (W P), 52  
 Table spar, Lake Champlain: Vanuxem, 21a  
 Tourmaline of Crown Point: Blake (W P),  
   08a; Port Henry: Williams (E H), 76  
 Trappean minerals: Beck, 43a  
 Vauquelinite, Sing Sing: Torrey, 37  
 Warwick, Orange Co.: Ries, 94a



## New York—Continued.

*Mineralogy*—Continued.

- Warwickite: Shepard, 38b, 39a; Orange Co.: Smith (J L), 53a, 56  
 Wernerite, Gouverneur: Rath, 53  
 Wilsonite, St. Lawrence Co.: Root, 68  
 Wollastonite: Ries, 94  
 Xanthite, Orange Co.: Mather, 30  
 Zircon, Orange Co.: Meade (W), 30

*Paleontology*.

- Agelacrinites, Chemung beds: Clarke (J M), 01a  
 Agoniatite limestone fauna: Wilson (J D), 03  
 Algae, Chemung: White (D), 02b  
 Trenton limestone: Ruedemann, 09a: Whitfield, 94a  
 Amber, Kreischerville, Staten Island: Hollick, 04c, 05, 05a, d, 06a  
 Amnigenia, occurrence: Clarke (J M), 01b  
 Annelid teeth, Ontario Co.: Clarke (J M), 87  
 Araucariopitys: Jeffrey, 07  
 Arthroacantha ithacensis: Williams (H S), 84b  
 Asaphus, Genesee Co.: Green (J), 33  
 Astylospongia, Lower Helderberg: Hall, 63e  
 Autodetus and Protocalyptraea: Clarke (J M), 94d  
 Becraft Mountain, Columbia Co.: Grabau, 03  
 Beecherella, Lower Helderberg: Ulrich, 91  
 Beekmantown fauna: Whitfield, 89; Walcott, 79c; Mohawk Valley: Cleland, 03  
 Bilobites, Catskill Mountains: Dekay, 23  
 Bison, Syracuse: Underwood, 90  
 Brachiopoda: Hall, 60a, 67a, 93, 94b, 97a  
 Devonian: Hall, 57, 63  
 Silurian, development: Beecher, 89  
 Bronteus, Chemung: Clarke (J M), 89a  
 Bryozoa, Hamilton group: Hall, 84d, 87, 91b;  
 Rochester shale: Bassler, 06a  
 Calceocrinidae: Ringueberg, 89  
 Calciferous, Mohawk Valley: Cleland, 00  
 Cambrian fossils: Ford (S W), 72; Hall, 47, 73b;  
 Whitfield, 84  
 Stissing: Dwight, 90c  
 Troy: Martin (D S), 73  
 Carboniferous, southwestern N. Y.: Glenn, 03  
 Caryocrinites, Lockport: Say, 25  
 Castoroides, Madison Co.: Smith (B), 14b  
 Catalog of fossils: Hall, 48a, 51, 59h  
 Cephalopoda, Beekmantown and Chazy formations: Ruedemann, 06  
 Ceratiocaris acuminata, Buffalo: Stose, 94  
 Ceraurus, Chazy: Raymond (P E), 16c  
 Ceraurus pleurexanthemus, Trenton Falls: Walcott, 76 b, c  
 Chazy fauna: Raymond (P E), 05b, 06; Walcott, 79b  
 Brachiopoda and Ostracoda: Raymond (P E), 11  
 Gastropoda: Raymond (P E), 08  
 Valcour Island: Hudson, 05  
 Chemung (base): Williams (H S), 83  
 Chemung fauna: Hall, 62; Kindle, 96  
 crinoids: Williams (H S), 82a  
 Ithaca section: Williams (H S), 06  
 Cirriped, Devonian: Clarke (J M), 82a  
 Climactichnites: Woodworth, 03a

## New York—Continued.

*Paleontology*—Continued.

- Clinton fauna: Chadwick, 18; Ringueberg, 82  
 Clymenia, Naples beds: Clarke (J M), 92d  
 Clymenia fauna, Devonian: Raymond (P E), 12  
 Cobleskill limestone: Hartnagel, 03  
 Coelenterata, Lower Helderberg: Girty, 97  
 Columbia Co., Ordovician: Bishop (I P), 90  
 Conocardium: Dekay, 23  
 Conodonts: Hinde, 79  
 Conotreta, Trenton Falls: Walcott, 90d  
 Conularia, sessile: Ruedemann, 96  
 Coral beds, Hamilton shale: Smith (B), 12  
 Corals, Niagara and Helderberg: Hall, 84f  
 Cretaceous plant remains: Hollick, 06, 06g  
 Long Island: Hollick, 03  
 Staten Island: Hollick, 84, 86, 86b, 89b, 92, 92a  
 b, c, d, 94, 94g, 96f, 98a, 04; lea-bearing sandstones: Britton (N L), 85, 85a; coniferous remains, Kreischerville: Hollick, 09a  
 Cretaceous Pityoxyla: Jeffrey, 06  
 Crinoidea: Springer, 11a  
 Devonian: Hall, 62c  
 Helderbergian: Hall 79a  
 Lockport shales: Ringueberg, 82a  
 Niagaran: Ringueberg, 90  
 Schoharie: Silliman, 36  
 Crown Point section, Essex Co.: Raymond (P E), 02  
 Crustacea, Chemung group: Clarke (J M), 97a  
 Devonian: Hall, 63f  
 Pseudoniscus and Phyllocarida: Clarke (J M), 02a  
 Cryptozoa, Ordovician: Seely, 06  
 Cryptozoön: Hall, 83g; Rothpletz, 15  
 Ctenacanthus wrighti, Yates Co.: Newberry, 84b  
 Cuboides zone: Williams (H S), 90  
 Dactyloidites, Washington Co.: Hall, 86b  
 Dadoxylon: Dawson (J W), 91c  
 Dalmanellas of the Chemung: Williams (H S), 08  
 Dalmanites, Port Jervis: Barrett, 76  
 Description of species: Conrad, 38a  
 Devonian: Clarke (J M), 89c; Conrad, 42a; Hall, 61b; Olsson, 12a; Williams (H S), 83b, 84, 03, 10b  
 Brachiopoda: Hall, 67  
 Cayuga Lake: Williams (H S), 80a  
 corals: Hall, 76a; and Bryozoa: Hall, 87  
 Crustacea: Clarke (J M), 83; Hall, 88  
 faunas, indigene and alien: Clarke (J M), 02g  
 flora: Dawson (J W), 62a  
 glass sponges: Clarke (J M), 18a  
 Mollusca: Hall, 79  
 Ontario Co.: Clarke (J M), 85a  
 Pelecypoda: Hall, 84, 85  
 Pisces: Eastman, 07b; Williams (H S), 82c  
 Plantae: Dawson (J W), 63b, 81c  
 recurrence of faunas: Williams (H S), 82b  
 southwestern N. Y.: Glenn, 03  
 vertical range of fossils: Claypole, 85c  
 western N. Y.: Clarke (J M), 91e; Slocum, 06  
 Diatoms: Edwards (A M), 60; Neocene, Long Island: Edwards (A M), 96



## New York—Continued.

*Paleontology*—Continued.

- Dictyonema fauna, eastern N. Y.: Ruedemann, 03  
 Dictyophyton: Roemer, 61; Chemung: Hall, 63h  
 Dictyospongidae: Hall, 84 g, 87b, 98; Chemung group: Hall, 90a  
 Dinichtyd armor plates, Marcellus shale: Smith (B), 09a  
 Dinichtys, Portage group: Ringueberg, 84a  
 Diplograptus: Ruedemann, 97  
 Drift, fossils in, Brooklyn and Westport: Desor, 47b  
   Staten Island: Gratacap, 87a, 89, 91a, 92, 93, 94, 94a; Hollick, 93g, 95b, 98b, 00, 03e, 04b, 08  
 Dutchess Co.: Dwight, 89; Ordovician: Dwight 90e  
 Elaphus, Ontario Co.: Hall, 87c  
 Elephas: Anon, 37; Wyoming Co.: Clarke (J M), 87a  
 Elephas americanus, Cortlandt Co.: Woolworth, 47  
 Embryocrinus problematicus: Hudson, 18a  
 Eozoonal rock, Manhattan Island: Gratacap, 87  
 Equus major, Troy: Skilton, 58  
 Erie Co.: Grabau, 98a; Houghton (F), 14  
 Eunoa: Clarke (J M), 02f  
 Eurypterid fauna, Salina: Sarle, 03  
 Eurypterida: Clarke (J M), 12c; habitat: O'Connell, 16  
 Eurypterus: DeKay, 25, 27; Harlan, 34; Roemer, 48d  
   Buffalo: Pohlman, 85; Roemer, 78  
   Oneida Co.: Mitchell, 18a  
 Eurypterus fauna of Shawangunk grit: Clarke (J M), 07c, e  
 Eusarcus and Pterygotus, Buffalo: Grote, 75a  
 Eusarcus scorpionis, Buffalo: Grote, 75  
 Fenestellidae: Simpson, 94  
   Hamilton group: Hall, 83d, 87, 87d  
   Lower Helderberg: Hall, 87d, 88c  
 Fish beds, Hamilton group: Bradley, 66  
 Fish fauna, Delaware Co.: Eastman, 99  
   Eighteenmile Creek: Hussakof, 15  
   Corniferous, Buffalo: Mixer, 86  
 Fishes: Dekay, 42  
   Devonian: Mixer, 96; Smith (B), 10  
   Genesee and Portage shales: Williams (H U), 86  
   in museum of Buffalo Society of Natural Sciences: Hussakof, 18  
 Flagstones: Stevens (R P), 74  
 Flora, Devonian: Hall, 63i  
 Fort Lee dinosaur: Matthew (W D), 11  
 Fossil forest fire: Hollick, 06c  
 Fossil tooth: Silliman, 34a  
 Fossil tracks, Potsdam sandstone: Ferrier, 83  
 Fourth geological district: Hall, 43  
 Fresh-water fossils, Bronx Borough, New York City: Humphreys, 09  
 Fucoid: Harlan, 32; Hollick, 10b  
 Fungi, Silurian: Loomis, 00a  
 Gardiner's Island, Suffolk Co., post-Pliocene: Smith (S), 65

## New York—Continued.

*Paleontology*—Continued.

- General: Bigsby, 58; Clarke (J M), 91, 92, 92a, 93, 99c, d, 02b, 05; Conrad, 38a, 39, 40, 41; Hall, 44a, 48b, 62h, 82, 89; Lincklaen, 61  
 Goniatite limestone fauna: Wilson (J D), 01  
 Goniatites, Marcellus shale: Hall, 60c  
 Goniatitidae: Hall, 75  
 Goniograptus thureauui: Ruedemann, 02a  
 Graptolite beds, Rensselaer Co.: Ruedemann, 02  
 Graptolites: Hall, 60; Ruedemann, 04, 08; Utica slate, Poughkeepsie: Booth, 83  
 Guelph fauna: Clarke (J M), 03f  
 Gymnosperms, Cretaceous, Kreischerville: Hollick, 07a  
 Hamilton fossils: Hall, 60b, 62, 62f  
   Bethany, Genesee Co.: Monroe, 02  
   Cayuga Lake section: Cleland, 03a  
   western N. Y.: Grabau, 99  
 Helderberg: Hall, 59; Bryozoa and corals: Hall, 74a, 79b, 87  
 Helderbergian crinoids: Talbot, 05  
 Hippodophycus: Hall, 72a  
 Holonema, plates: Williams (H S), 91b  
 Homalonotus, Oriskany sandstone: Whitfield, 85c  
 Homocrinus: Kirk, 14  
 Hudson River beds, Albany region: Ruedemann, 01  
 Hudson River fossils, Orange Co.: Darton, 85  
 Hyolithes, Port Jervis: Barrett, 76a  
 Hypsocrinus: Springer, 06a  
 Ichthyodorulite: Hopkins (W), 55  
 Infusoria, West Point: Bailey (J W), 38; Ehrenberg, 39  
 Insect borings in Cretaceous lignite: Hollick, 06d  
 Interglacial fauna in Cayuga Valley: Maury, 08  
 Invertebrata, Paleozoic: Ruedemann, 16  
 Isotelus: Dekay, 24a  
 Ithaca fauna, central N. Y.: Clarke (J M), 05d; Kindle, 96  
 Lepidocoleus: Clarke (J M), 96  
 Lepidodendron, Ontario Co.: Clarke (J M), 87b  
 Lingulella, Troy: Ford (S W), 78a  
 Livingston and Genesee cos.: Green (H A), 66  
 Livonia salt shaft fossils: Clarke (J M), 94, 94a  
 Long Island, Silurian fossils in drift: Martin (D S), 76a  
 Lorraine fauna: Foerste, 14a  
 Lower Helderberg corals and bryozoans: Hall, 83b, 87  
 Mammalia, Onondaga Lake: Smith (B), 14  
 Mammoth, Genesee Valley: Dewey, 37a  
 Manlius fauna, Erie Co.: Grabau, 00b  
 Marcellus fauna and flora: Clarke (J M), 89b  
 Marcellus limestones: Clarke (J M), 01, 03i; Erie Co.: Wood (Elvira), 01  
 Mastodon: Clarke (J M), 03b  
   Chester: Hovey, 08c  
   Cohoes: Hall, 71; Marsh, 67; Safely, 66  
   distribution: Clarke (J M), 03k  
   Hudson River: Annan, 93  
   Ithaca: Hartt, 71; Sheldon (P), 15; Wilder, 71  
   Jamestown: Cheney, 72  
   Long Island: Brevoort, 59



## New York—Continued.

*Paleontology*—Continued.

- Mastodon: New York Island: Whitfield, 91b  
 Ontario Co.: Van Rensselaer, 27  
 Orange Co.: Gordon (R), 02; Lucas (F A), 02d; Miller (S), 36; Prime, 45; Shurtleff, 46  
 Rochester: Guernsey, 31  
 Staten Island: Hollick, 01a  
 Wyoming Co.: Clarke (J M), 88  
 Microscopic organisms in clays: Ries, 94d; in siliceous nodules: White (M C), 62  
 Mollusca: Hall, 88  
 Naples fauna: Clarke (J M), 99, 04; Dreverman, 05  
 Nematophyton: Penhallow, 93a; Prosser, 02b; Waterlime, Buffalo: Penhallow, 96a  
 Nepheliospongia, Chemung group: Clarke (J M), 00c  
 Niagara fauna: Hall, 67e, 71a; Ringueberg, 82, 84, 86, 88a  
 Niagara Falls region: Grabau, 01  
 Northern N. Y.: Emmons (E), 42  
 Oldhamia: Walcott, 94c  
 Olean quadrangle, faunas: Butts, 03; Clarke (J M), 02e  
 Onondaga Co.: Schneider, 94  
 Orange Co., Trilobite Mountain: Shimer, 05  
 Ordovician: Conrad, 42a; Hall, 47; Kalm, 70  
 Champlain Valley: White (T G), 00  
 Columbia Co.: Dwight, 87a  
 Oriskany fauna: Clarke (J M), 09a; Hall, 59; Schuchert, 89  
 Becraft Mountain: Clarke (J M), 00  
 Columbia Co.: Beecher, 92  
 Orthoceras, Oneonta beds, Chenango Valley: Clarke (J M), 00a  
 Ostracoda: Jones (T R), 90; Ulrich, 90f, 00  
 Palæechinoidea: Olsson, 12  
 Palæophonus, Waterville, Oneida Co.: Whitfield, 85d  
 Paleaster eucharis: Cole (A H), 92  
 Paleobotany, Cretaceous, Long Island: Hollick, 12a; Onondaga: Schneider, 03a  
 Paleontology, progress: Hall, 51a  
 Paleozoic fossils, types: Clarke (J M), 07d  
 Paradoxides: Hall, 37a  
 Paradoxus, Lockport: Bigsby, 25a  
 Paropsonema, Portage beds: Clarke (J M), 00b  
 Pelecypoda: Hall, 84b; Devonian: Hall, 71b, 84e  
 Pelmatozoa, Chazy beds: Hudson, 07  
 Phragmites, Staten Island: Hollick, 97  
 Phyllopods, Devonian: Clarke (J M), 82  
 Plantæ, Devonian: Penhallow, 93  
 Long Island: Britton, 84  
 Orange Co.: Nevius, 00  
 in limonite, Staten Island: Hollick, 94h, 97e  
 in sandstone, Williamsburgh: Newberry, 71f  
 Tertiary and Cretaceous: Penhallow, 06  
 Platygonus, Rochester: Leidy, 89g  
 Pleasant Valley: Dwight, 90a  
 Plectoceras jason: Ruedemann, 12  
 Portage fauna: Kindle, 96; Whitfield, 05  
 Post-Pliocene, Niagara River gravels: Letson, 01

## New York—Continued.

*Paleontology*—Continued.

- Potsdam, Poughkeepsie: Dwight, 86a  
 Rensselaer Co.: Ford (S W), 73  
 Troy: Ford (S W), 73a  
 Potsdam-Hoyt fauna: Walcott, 10  
 Poughkeepsie region: Dale, 78, 79b, d; Dwight, 80a  
 Primordial fossils: Ford (S W), 72, 78c  
 Columbia Co.: Ford (S W), 84  
 Rensselaer Co.: Ford, 75, 76  
 Proscorpius, Waterville: Whitfield, 85a  
 Proscorpius osborni: Fritsch, 07  
 Protichnites, Potsdam sandstone: Marsh, 69  
 Protobalanus, Marcellus shale: Whitfield, 89b  
 Protoctyathus, Troy: Ford (S W), 78  
 Psaronius, Devonian: Hall, 72d, e  
 Pterygotus, Buffalo: Grote, 78  
 Ptilophyton: Dawson (J W), 82c  
 Reindeer antler, Sing Sing: Fisher, 59  
 Remopleurides, Trenton Falls: Walcott, 75a  
 Reticularia laevis, range and distribution: Kindle, 06  
 Rhinocaris, Ontario Co.: Clarke (J M), 93c  
 Rhipidomella: Williams (H S), 10c  
 Rhombodictyon: Whitfield, 86a  
 Rodent, Wayne Co.: Wyman, 46a  
 Rondout: Van Ingen, 03  
 Rugose corals: Simpson (G B), 00  
 Schoharie Valley: Grabau, 06  
 Serenopsis, Cretaceous, Long Island: Hollick, 93c, d  
 Silurian: Conrad, 42a; Hall, 52  
 gastropods: O'Connell, 14a  
 Port Jervis: Barrett (S T), 78  
 Solenopleura, Troy: Ford (S W), 78  
 Sphaeroma bumastiformis: Eights, 42  
 Spheroecoryphe, Trenton Falls: Walcott, 75  
 Spiraxis: Newberry, 85c; Chemung group: Newberry, 85g  
 Spirifer laevis, Portage group: Williams (H S), 80, 81  
 Spirifera: Hall, 66a  
 Spirophyton: Hall, 63g  
 Spongida, Lower Helderberg: Girty, 97; Silurian: Duncan, 79  
 Stafford limestone: Talbot, 03  
 Starfishes near Saugerties: Clarke (J M), 12b  
 State paleontologist, reports: Clarke (J M), 02, 02b, 03a, 05  
 State Museum, type material, Annelida and Cephalopoda: Clarke (J M), 93a; Crustacea: Clarke (J M), 92b  
 Stromatocerium: Seely, 94  
 Stylonurus, Catskill group: Hall, 83f; Martin (D S), 82; Delaware Co.: Hall, 85g  
 Syracuse quadrangle: Smith (B), 14a  
 Taconic, Canaan: Ford (S W), 86; Washington Co.: Walcott, 87b  
 Tertiary shells, Long Island: Gratacap, 14  
 Tetracaulodon, New York, Orange Co.: Godman, 30  
 Third geological district: Vanuxem, 42  
 Tornoceras, Erie Co.: Beecher, 90  
 Trails and tracks, Clinton sandstones: Hall, 50a  
 Tree ferns, Devonian: Dawson (J W), 71c  
 Tree trunk from Middle Devonian: White (D), 07



## New York—Continued.

*Paleontology*—Continued.

- Trees, Schoharie Co.: Hall, 71c  
 Trenton fossils: Hall, 50; Raymond (P E), 03;  
 Walcott, 76, 84b; Rysedorph Hill, Rensselaer Co.: Ruedemann, 01a  
 Trenton and Black River formations: Coryell, 16  
 Trenton Falls, Oneida Co.: White (T G), 96  
 Triarthrus, Utica: Harlan, 35b  
 Trilobites, Beekmantown: Raymond (P E), 10  
 Calymene: Green (J), 38  
 Cambrian: Hall, 59g  
 Chazy: Raymond (P E), 10b  
 Devonian: Hall, 62b  
 larval forms, Lower Helderberg: Beecher, 93c  
 Lowville and Black River formations: Raymond (P E), 10a  
 Potsdam sandstone: Billings, 60a; Bradley, 60  
 Troy: Ford (S W), 77a, 81a  
 Tropidoleptus fauna, Canandaigua Lake: Raymond (P E), 04  
 Tropidoleptus zones, Devonian: Williams (H S), 13  
 Tully limestone: Williams (S G), 87a; dwarf fauna: Loomis, 03  
 Type specimens: Clarke (J M), 05  
 Upper Helderberg: Hall, 62, 86a; Bryozoa: Hall, 83b, 87  
 Urasterella: Hudson, 16  
 Utica fossils, Albany: Beecher, 83  
 Utica slate fauna: Walcott, 83a  
 Vulpes, Broome Co.: Redfield, 50  
 Wappinger Valley: Dwight, 81, 84  
 Wappinger Valley limestone, Dutchess Co.: Dwight, 80, 83  
 Waterlime fauna, Buffalo: Pohlman, 81, 82, 86  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 Worm(?) burrows, Chemung rocks: Whitfield, 04b  
 Worms, Devonian: Clarke (J M), 03d  
 Yates Co.: Wright (B H), 84

*Petrology*.

- Adirondack region: Kemp, 94a, 99b; Leeds, 77; Miller (W J), 14b  
 anorthosite: Kemp, 96c; Miller (W J), 18a  
 augite syenite: Cushing, 01a  
 Avalanche Lake, shear zone: Kemp, 92c  
 basic intrusives: Miller (W J), 13b  
 dikes: Kemp, 96d  
 eastern: Kemp, 95b  
 Loon Lake, augite syenite gneiss: Cushing, 99b  
 northern: Cushing, 05a  
 northwestern: Smyth (C H), 95  
 syenite batholith, asymmetric differentiation in: Cushing, 07a  
 syenite porphyry dikes: Cushing, 98  
 Alnoite dikes, Manheim: Smyth (C H), 93a, 96a  
 Anthophyllite on Manhattan Island: Kinney, 10  
 Basic rock from granite, Jefferson Co.: Smyth (C H), 94a  
 Bedford area: Luquer, 96  
 Blue Mountain quadrangle: Miller (W J), 17  
 Bluestone near Ashokan dam: Berkey, 08

## New York—Continued.

*Petrology*—Continued.

- Boulders, Canandaigua Lake: Emerson (B K), 93  
 Camptonite dikes, Washington Co.: Kemp, 89  
 Canton quadrangle, pre-Cambrian rocks: Martin (J C), 16  
 Celestite-bearing rocks: Kraus, 05  
 Cortlandt and Stony Point rocks: Dana (J D), 84b  
 Cortlandt series, near Peekskill: Berkey, 08c; Rogers (G S), 11a; Williams (G H), 88a, b,d; Rosetown extension: Kemp, 88b  
 Cortlandtite: Williams (G H), 85e  
 Dikes, Clinton Co.: Eakle, 93  
 Clintonville, Onondaga Co.: Smyth (C H), 10  
 Hudson River Highlands: Kemp, 88c  
 Manhattan schists, New York City: Kemp, 99f  
 Syracuse: Darton, 95; Schneider, 02; Smyth (C H), 02a  
 Diorite dike, Orange Co.: Kemp, 88,  
 Essex Co.: Kemp, 95; Essex and Willsboro townships: White (T G), 94  
 Fissure inclusions in fibrolitic gneiss, New Rochelle: Julien, 79a  
 Foliation in pre-Cambrian rocks of Adirondacks, origin: Miller (W J), 16b  
 Gabbro, St. Lawrence Co., metamorphism: Smyth (C H), 96  
 Gabbro and granite in Warren Co.: Miller (W J), 12a  
 Gabbros, Adirondacks: Kemp, 94a; southwestern: Smyth (C H), 94b  
 Lake Champlain: Kemp, 94a  
 Granite, Warwick, Orange Co.: Kemp, 94b  
 Granite diorite, Harrison, Westchester Co.: Ries, 95a  
 Gouverneur, gneisses: Smyth (C H), 93  
 Graphite schist, Tuxedo Park: Bayley, 08; Stewart (C A), 08a  
 Kyanite gneiss, New York City: Martin (D S), 71  
 Little Falls quadrangle: Cushing, 05  
 Manhattan Island: Hovey, 06f  
 amphibole schists and serpentines: Julien, 03  
 lithology: Friedrich, 89b  
 pegmatites, origin: Julien, 00d  
 peridotite dike: Kunz, 06  
 Manhattan schist: Fettke, 14  
 Norites, Cortlandt series: Williams (G H), 87a,g  
 Northumberland volcanic plug, Saratoga Co.: Cushing, 03; Woodworth, 03  
 Ophiolite, Warren Co.: Merrill (G P), 89c  
 Paradox Lake quadrangle: Ogilvie, 05  
 Peridotite, central N. Y.: Smyth (C H), 92  
 Peridotite dikes, Ithaca: Matson, 05  
 Peridotites, Cortlandt series: Williams (G H), 86b  
 Poughkeepsie quadrangle: Gordon (C E), 11  
 Ravenswood granodiorite: Ziegler, 11  
 Saratoga Co., Northumberland volcanic plug: Cushing, 13  
 Serpentines, Manhattan Island: Newland, 01  
 Britton, 87c; Merrill (F J H), 98a  
 Staten Island: Gratacap, 87b; Hollick, 96e, 02b, 10c, 11a; Hunt, 83g; Julien, 10a  
 Syracuse: Kraus, 04a; Williams (G H), 87d



## New York—Continued.

*Petrology*—Continued.

- Serpentinous rocks: Merrill (G P), 90  
 Staten Island: Britton (N L), 87d  
 Syenite-granite series, Adirondack Mountains: Miller (W J), 18b  
 Syracuse, peridotite dikes: Clark (B W), 14  
 Thousand Islands region, pre-Cambrian: Cushing, 10a  
 Tourmaline zones, Alexandria Bay: Smyth (C H), 02  
 Trap dikes, Champlain Valley: Kemp, 91b, 93d

*Physical geology*.

- Adirondacks, lake filling: Smyth (C H), 93  
 Anticlinal ridges, postglacial: Gilbert, 86b, 91  
 Arched structure in Lockport limestone: Fairchild, 08a  
 Ball's Cave, Schoharie: Shepard, 35b  
 Batrachioides the antiquor, Lockport: Silliman (jr), 51a  
 Beach structure in Medina sandstone: Fairchild, 01b  
 Boulders borne by icebergs, Ithaca region: Von Engeln, 18  
 Caves: Clarke (J M), 07d  
 Channel fillings in Devonian shales: Williams; (H S), 81b  
 Chimney Mountain rift, Adirondack Mountains: Miller (W J), 15a  
 Clay, Long Island, origin: Merrill (F J H), 99  
 Claystones, Hanover: Edwards (A M), 71a  
 Concretions, Chemung: Kindle, 04b  
 Cortlandt series, gneissoid structure: Rogers (G S), 11  
 Cusp, wave-formed, Lake George: Comstock, 00  
 Cylindrical structure in Potsdam sandstone: Hough, 51  
 Deformation, post-Ordovician, St. Lawrence Valley: Chadwick, 15  
 Deposition of tufa: Sanford, 30  
 Dikes, Clintonville, Onondaga Co.: Smith (B), 09, 10  
   East Canada Creek: Schneider, 05a  
   Hudson River Highlands: Kemp, 88e  
   metamorphosed, Morningside Heights: Julien 00a; Kemp, 00c  
 Dip in central New York: Williams (S G), 83  
 Dislocations, Thirtymile Point: Gilbert, 99b;  
   Atlantic Coastal Plain: Hollick, 94f  
 Earthquake, December, 1874: Martin (D S) 75  
   records at Albany: Clarke (J M), 07d; Newland, 06a  
   western N. Y., 1857: West, 58  
 Eastern N. Y.: Dale, 96, 02  
 Exfoliation domes, Warren Co.: Miller (W J), 11a  
 Falls of Mohawk, Cohoes: Pynchon, 95  
 Faulting, Chazy township: Cushing, 95  
   eastern N. Y.: Chadwick, 17a  
   postglacial: Woodworth, 07  
   Rondout: Dale, 79a  
   Saugerties, Ulster Co.: Chadwick, 10  
   Syracuse region: Schneider, 97  
 Fetid limestones: Beck, 43d  
 Folded strata at Trenton Falls: Miller (W J),

## New York—Continued.

*Physical geology*—Continued.

- Folding, central N. Y.: Williams (H S) 83c;  
   Watkins Glen quadrangle: Kindle, 04c  
 Foliation in pre-Cambrian rocks of Adirondacks, origin: Miller (W J), 16b  
 Fracture systems: Hobbs, 05  
 Gabbro, St. Lawrence Co., metamorphism: Smyth (C H), 96  
 Glacial erosion, Finger Lake region, amount: Lincoln, 94; longitudinal valleys: Carney, 07a  
 Glacial potholes, Crown Point: Barker, 13  
 Glacial rock sliding: Jones (C C), 07  
 Glacial scouring: Hall (J), 43i  
 Glacial sculpture, western N. Y.: Gilbert, 99a  
 Gneisses, origin: Berkey, 14  
 Gravel deposit: Eaton (A), 22a  
 Helderberg front, structural features: Grabau, 12e  
 Hudson Valley, structural features: Shaler, 77g  
 Inclined stratification, Warren Co., N. Y.: Whitney, 57a  
 Intraformational contorted strata, Trenton Falls: Miller (W J), 15  
 Joint caves of Valcour Island: Hudson, 10  
 Jointing, Ithaca region: Sheldon (P), 12  
 Lake Mohonk and Lake Minnewaska: Niles, 94  
 Landslide, Coxsackie: Dwight, 66a  
 Landslides in unconsolidated sediments, Hudson Valley: Newland, 09a, 16a  
 Local decomposition of rock by the corrosive action of preglacial peat bogs: Humphreys, 11  
 Long Island, changes of level: Lewis (E), 77b  
   coastal subsidence: Lewis (E), 68  
   postglacial marine submergence: Fairchild, 17a  
   recent changes: Buffet, 03  
 Marcellus fault, Onondaga Co.: Schneider, 99  
 Medina sandstone, beach structure in: Fairchild, 01b  
 Metamorphism: Beck, 44  
   Adirondacks: Kemp, 96c  
   Westchester Co.: Callaway, 87; Dana (J D), 80e; Harker, 87  
 Mitchell's cave, Montgomery Co.: Eights, 48  
 Moulin potholes in New York City: Julien, 10  
 Mud flow markings: Whitfield, 00  
 Niagara Falls: Gunning, 72; Holley, 72; Tyndall, 73  
   geology: Shaler, 93c  
   recession: Gilbert, 07; Hall (W C), 07; Spencer (J W), 07a, 16  
 Niagara gorge, lateral erosion at mouth: Wright (G F), 99b  
 Oscillations during Cambro-Silurian: Cushing, 07c  
 Overthrust faults, central N. Y.: Darton, 93; Schneider, 05; Wheelock, 05  
 Palisades diabase, contact metamorphism: Irving, 98  
 Plastic deformation of Grenville limestone, Port Henry region: Newland, 18  
 Polished limestone, Rochester: Dewey, 39, 43



## New York—Continued.

*Physical geology*—Continued.

- Potholes: Gilbert, 71  
 Catskill: Hubbard (O P), 89; Osborn, 00d  
 Williamsbridge: Britton, (N L), 82a  
 Quartz nodule with radiate structure: Davidson (J M), 06  
 Recent changes in elevation, New York City region: Tuttle, 04  
 Rensselaer grit plateau: Dale, 93  
 Replacement of quartz by pyrite: Smyth (C H), 05a  
 Ripple marks: Hough, 52  
 Keeseville: Wyman, 66  
 Medina formation: Gilbert, 99c  
 Rondout: Van Ingen, 03  
 Schodack Landing, Rensselaer Co., fault: Ford (S W), 85  
 Strand markings, Portage group: Clarke (J M), 18b  
 Stream robbing, Catskill Mountains: Darton, 96g  
 Structural features, southeastern N. Y.: Hobbs, 03a  
 Submarine slide at Trenton Falls: Hahn, 13  
 Subsidence, Long Island: Cook (G H), 57b  
 Trough faulting in southern Adirondacks: Miller (W J), 10b  
 Unconformity, Rondout: Davis (W M), 83d  
 Undulations in Niagara strata: Gilbert, 05c  
 Unstable rocks under Hudson River: Berkey, 17b  
 Vassar College region: Shattuck, 07b  
 Vein formation, central N. Y.: Taber (S), 18  
 Water biscuit, Canandaigua Lake: Clarke (J M), 00d  
 Weathering of alnoite, Manheim: Smyth (C H), 98

*Physiographic geology*.

- Abandoned shore lines: Woodworth, 07a  
 Adirondack and Catskill Mountains, local glaciation, date: Johnson (D W), 17  
 Adirondack Mountains: Alling, 16; Kemp, 05g, 06a, 07e; Miller (W J), 17a  
 ice movement and erosion: Miller (W J), 09a  
 northern: Cushing, 05a  
 Pleistocene geology: Miller (W J), 09b  
 pre-Cambrian topography: Kemp, 96f  
 trellised drainage: Brigham (A P), 98  
 Black and Mohawk valleys: Fairchild, 12  
 Blue Mountain quadrangle: Miller (W J), 17  
 Broadalbin quadrangle, Fulton-Saratoga cos.: Miller (W J), 11b  
 Bronx River, diversion of course: Kemp, 96g, 97c  
 Buried river channels: Kemp, 08c, 15b  
 Camp Mills region, Long Island: Alden, 18a  
 Camp Upton region: Alden, 18b  
 Catatonk quadrangle, drumlinoids: Hubbard, 06  
 Catatonk Valley, river terraces and reversed drainage: Mills (F S), 03a  
 Catskill Mountains: Guyot, 80; Heilprin, 07; Julien, 81  
 eastern, rectilinear features: Chadwick, 16  
 northern: Rich, 15b  
 origin: Clarke (J M), 15c  
 topographic development: Merwin, 11c

## New York—Continued.

*Physiographic geology*—Continued.

- Cayuga (Lake): Simonds, 94a; Spencer (J W), 94a; Tarr, 94c; a rock basin: Tarr, 94a  
 Cayuga Lake valley: Nevius, 99a  
 Central-western N. Y.: Grabau, 08f  
 Champlain coast lines: Hudson, 09  
 Champlain Valley, ancient water levels: Woodworth, 05a; Pleistocene history: Baldwin, 94  
 Chautauqua region: Tarr, 96b  
 Cliff Haven: Hudson, 18  
 Clove Valley Pleistocene lake basin: Gratacap, 01a  
 Crown Point embayment, ancient water levels: Barker, 16  
 Deltas in Finger Lake region: Dryer, 10  
 Diluvial deposits: Eaton (A), 27  
 Drainage, central N. Y.: Tarr, 05b  
 Drainage change, Fall Creek region: Carney, 03  
 Tompkins Co.: Hausman, 18  
 Drainage evolution in central N. Y.: Fairchild, 09d  
 Drift and kame deposits, Staten Island: Hollick, 00a  
 Drift deposits: Desor, 48  
 Albany region: Eights, 52  
 Arrochar, Staten Island: Hollick, 93e  
 Long Island: Bryson, 88, 91, 98  
 shore of Lake Erie: Hall, 43g  
 southern limit: Cook (G H), 79a  
 Staten Island: Britton (N L), 86a, 88b; Hollick, 99, 99a  
 Drift hills, western N. Y.: Johnson (L), 82  
 Drumlinoids Catatonk quadrangle: Hubbard, 06  
 Drumlins: Fairchild, 07a, f  
 Eastern central N. Y.: Rich, 14  
 Erian drainage, western N. Y.: Gilbert, 97b  
 Eskers, Rochester district: Giles, 18a; Upham, 93i; western N. Y.: Comstock (F M), 03  
 Finger Lake basins, origin: Von Engeln, 18a  
 Finger Lake region: Dryer, 04, 06; Fairchild, 95c; Lincoln, 92; Rich, 08; Tarr, 94a, 05e, 06a; Watson, 99  
 glacial drainage features: Rich, 08  
 glacial erosion: Campbell (M R), 04d  
 gorges: Tarr, 06b  
 pre-Wisconsin drift: Carney, 07  
 Finger Lakes: Brigham (A P), 93; Foote (C W), 77  
 Gardiner's Island, Suffolk Co., post-Pliocene: Smith (S), 65  
 General: Brigham, 05a; Miller (W J), 14; Tarr, 96, 02, 12a  
 Genesee Falls: Grabau, 07e  
 Genesee region, glacial lakes: Fairchild, 96c  
 Genesee River: Rogers, 93  
 preglacial course: Grabau, 94; Whitbeck, 02  
 Genesee Valley, Pleistocene history: Fairchild, 08  
 Gilbert Gulf: Fairchild, 07c  
 Glacial and postglacial history of Hudson and Champlain valleys: Peet, 04  
 Glacial and preglacial drifts, Staten Island: Britton (N L), 87b  
 Glacial deposits, Chenango Valley: Brigham, 97  
 original ice structures: Berkey, 11a



## New York—Continued.

*Physiographic geology*—Continued.

- Glacial drainage: Fairchild, 06a; central western N. Y.: Fairchild, 04e  
 Glacial Lake Bloomfield: Dryer, 08a  
 Glacial lakes, central N. Y.: Fairchild, 99b; western N. Y.: Fairchild, 95c, d, 00f; Catskill Valley: Chadwick, 10a  
 Glacial lakes and channels near Syracuse: Hopkins (T C), 10  
 Glacial stages: Fuller, 06h  
 Glacial striae, St. Lawrence Co.: Willcox, 73  
 Glacial waters, Finger Lake region: Fairchild, 99a  
 Oneida to Little Falls: Fairchild, 04b west and south of the Adirondacks: Fairchild, 09c  
 Glaciation: Upham, 89  
 Adirondacks: Alling, 16  
 Adirondacks and Champlain Valley: Ogilvie, 02  
 Catskill Mountains: Rich, 06, 17b, 18; Smock, 85; northern: Rich, 15b  
 Chautauqua region: Edson, 84  
 closing phase: Fairchild, 12a  
 eastern N. Y.: Wright (G F), 95a  
 Erie basin: Leverett, 02  
 Finger Lake region: Lincoln, 92  
 Irondequoit region: Dryer, 90  
 Ithaca region: Foote (C W), 77  
 Jefferson Co.: Lloyd, 76  
 Lake George region: Wright (G F), 95a  
 Long Island: Brysen, 83; Upham, 99e  
 Manhattan Island: Julien, 06b  
 multiple: Fairchild, 09a  
 New York City: Stevens (R P), 72  
 northeastern N. Y.: Kellogg, 92  
 northern N. Y.: Stevens (R P), 73; Willcox, 84  
 Shawangunk Mountain: Julien, 85  
 Staten Island: Hollick, 86a, 98c  
 Sullivan Co.: Thompson (W A), 33  
 Syracuse region: Brigham, 15a; Clarke (J M), 15f; Fairchild, 05b, c  
 western N. Y.: Fairchild, 97c  
 Gorge of the Hudson: Kemp, 10g  
 Gorges and falls of central N. Y.: Grabau, 08b; Tarr, 05d  
 Hanging valleys: Spencer (J W), 12a; Finger Lake region: Tarr, 04a  
 Honeoye-Irondequoit kame moraine; Dryer, 08  
 Horseheads outlet of glacial lakes, central N. Y.: Fuller, 03g  
 Hudson and Champlain valleys: Peet, 04  
 Hudson River, ancient gorge: Crosby, 14a; Wright (G F), 05d  
 highland gorge, origin: Merrill (F J H), 00  
 preglacial course: Miller (W J), 11  
 Storm King region: Kemp, 12a  
 submarine channel: Edwards (A M), 92; Hovey, 09i; Kemp, 09b; Lindenkohl, 91; Spencer (J W), 05  
 Hudson Valley: Dale, 04a; Davis (W M), 92; Kemp, 07d; Ries, 91b  
 ancient water levels: Woodworth, 05a  
 drift phenomena: Ramsay, 59  
 postglacial history: Merrill (F J H), 91a  
 Quaternary: Merrill (F J H), 91  
 upper: Fairchild, 17

## New York—Continued.

*Physiographic geology*—Continued.

- Hudsonian and Ontarian glacier lobes: Fairchild, 09b  
 Interglacial deposits: Baker (F C), 13  
 Interglacial fauna in Cayuga Valley: Maury, 08  
 Interglacial gorge problem: Matson, 04  
 Interglacial gorges of Six Mile Creek, Ithaca: Rich, 15a  
 Irondequoit Bay: Fairchild, 06  
 Irondequoit Valley, glacial history: Chadwick, 17  
 Iroquois beach: Spencer (J W), 90d  
 Iroquois extinction: Fairchild, 07g  
 Jamesville Lake: Quereau, 98  
 Joint-controlled drainage: Hobbs, 05c  
 Kame areas, western N. Y.: Fairchild, 96b, 00h  
 Kame-moraine, Rochester: Fairchild, 95b  
 Kames, Oriskany Valley: Harris (T W), 94  
 Kettle in glacial lake delta: Fairchild, 98b  
 Keuka Valley, wave-cut terraces: Carney, 07b  
 Lake basins, origin: Lincoln, 94  
 Lake Erie basin, glacial waters: Fairchild, 07  
 Lake George Valley: Kemp, 01e, 11f  
 Lake Ronkonkoma: Bryson, 94  
 Lake Warren and Geneva Beach: Fairchild, 97b  
 Lewis Co.: Bendrat, 08  
 Little Mountains, Greene Co.: Davis (W M), 82c  
 Long Island: Fuller, 14; Lewis (E), 77; Merrill (F J H), 86; Veatch (A C), 06c  
 boulder-like masses of clay: Lewis (E), 73  
 drift deposits: Fuller, 03f; Good Ground: Bryson, 96  
 drift mounds: Bryson, 93a  
 englacial drift: Bryson, 92  
 glaciation: Bryson, 93, 95; Veatch (A C), 03;  
 postglacial: Fairchild, 17a  
 postglacial marine submergence: Fairchild, 17a  
 surface geology: Bryson, 85  
 watercourses: Lewis (E), 77a  
 Long Island Sound, glaciation: Dana (J D), 90h  
 Manhattan Island: Julien 07a; river channels: Hobbs, 02e; origin: Hobbs, 05a  
 Manhattan Island and East River channel: Berkey, 09a  
 Minnewaska region, Ulster Co.: James (F W), 05  
 Mohawk glacial lobe: Brigham (A P), 11  
 Mohawk Valley: Pyncheon, 95  
 fault-block topography: Roorbach, 18  
 glacial deposits: Brigham (A P), 98a  
 stream gradients: Cumings, 00b  
 Mohawk Valley glacier: Dana (J D), 63a  
 Mooers quadrangle, Pleistocene: Woodworth, 05  
 Moraines: Leverett, 95a  
 Plattsburgh: Wright (G F), 98a  
 Seneca and Cayuga valleys: Tarr, 05a  
 terminal: Lewis (H C), 84; Upham, 79  
 western N. Y.: Taylor (F B), 12a  
 Moravia quadrangle, Pleistocene geology: Carney, 09c  
 Nassau Co., Pleistocene: Woodworth, 01  
 New York Bay: Lindenkohl, 85



## New York—Continued.

*Physiographic geology*—Continued.

- New York City district: Merrill (F J H), 02  
 Niagara Falls: Spencer (J W), 13c; age: Wright (G F), 99a; and gorge: Taylor (F B), 13a  
 Niagara Falls region: Fairholme, 34; Grabau, 01; Hall, 42  
 Niagara gorge: Pohlman, 86b; Upham, 01; profile of bed: Gilbert, 96g  
 Niagara quadrangle: Kindle 13c  
 Niagara region: Grabau, 01b; Lyell, 43; glacial: Belt, 75  
 Niagara River, relationship to glacial period: Spencer (J W), 10b  
 Northern N. Y.: Spencer (J W), 13  
 Ontario coast: Martin (J O), 01  
 Outwash drift: Carney, 07a, c  
 Overflow channel of pre-Wisconsin ponded waters: Carney, 08  
 Paleozoic, southern Adirondacks: Miller (W J), 13  
 Palisades of Hudson River: Kummel, 00a  
 Paradox Lake quadrangle: Ogilvie, 05  
 Peconic Bay and Shinnecock Hills, origin: Bryson, 93b  
 Pleistocene: Fairchild, 13  
   Hudson-Champlain Valley: Upham, 05c  
   southwestern slope of Adirondacks: Miller (W J), 10c  
   Syracuse region: Fairchild, 05a  
   upper Hudson Valley: Fairchild, 16b  
   western N. Y.: Fairchild, 02  
 Pleistocene history, Fishers Island: Fuller, 05v  
 Pleistocene lake bed, Essex Co.: Ries, 94b  
 Pleistocene uplift: Fairchild, 16a  
 Postglacial, upper Hudson Valley: Fairchild, 17  
 Poughkeepsie quadrangle: Gordon (C E), 11  
 Preglacial channels of lower Hudson Valley, Berkey, 06a  
 Preglacial course of upper Hudson River, Fairchild, 11; Kemp, 11f  
 Preglacial drainage in central western N. Y.: Grabau, 08f; central N. Y.: Carney, 04; Fairchild, 04d  
 Preglacial valleys in eastern N. Y.: Cook (J H) 09  
 Pre-Iroquois channels, central N. Y.: Fairchild, 03b  
 Quaternary lake deposit, Staten Island: Hollick, 99g  
 Reciprocal intercession by parallel streams: Chadwick, 11  
 Richmond and Great Barrington boulder trains: Benton, 78; Taylor (F B), 10b  
 Rochester district: Giles, 18a  
 Sand dunes, so-called, Long Island: Bryson, 91a  
 Scarps in the Adirondacks: Davis (W M), 06b  
 Schenectady quadrangle, glacial geology: Stoller, 11  
 Serpentine stock, Staten Island: Crosby, 14  
 Shawangunk Mountain, Ulster Co.: Darton, 94h  
 Shore lines, ancient: Merrill (F J H), 90a  
 Silver Lake, Staten Island: Hollick, 04a  
 Southeastern N. Y.: Berkey, 11; Davis (W M), 95c; Lobeck, 18

## New York—Continued.

*Physiographic geology*—Continued.

- Southern N. Y.: Campbell (M R), 03a  
 Staten Island, boulder trail: Hollick, 15a; glacial phenomena: Hollick, 98g  
 Syracuse quadrangle: Hopkins (T C), 14  
 Taconic physiography: Dale, 05a  
 Tectonic geography: Hobbs, 04a  
 Terraces: Desor, 50j; Mohawk Valley: Taylor (F B), 92  
 Tertiary drainage problems: Grabau, 09b  
 Watkins Glen: Tarr (R S), 06g  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 Western N. Y.: Fairchild, 96b, 02; Gilbert, 03c; Hayes (G E), 38  
 Whirlpool-Saint David's channel, Niagara River: Gilbert, 96f  
*Underground water.*  
 Catatonk area: Kindle, 05a  
 Fort Ticonderoga quadrangle: Dale, 05b  
 General: Rafter, 05; Weeks, 04, 05  
 Ithaca: Whitney (F I), 05  
 Long Island: Crosby, 00a; Darton, 96d; Veatch (A C), 04, 06b, c  
 Mineral spring, Albany: Meade (W), 28a  
 Mineral springs, Onondaga: Goessman, 66  
 Saratoga mineral springs: Clarke (J M), 14; Fish, 81; Kemp, 12; Steel, 29  
 Saratoga mineral waters, origin: Ruedemann, 14  
 Sulphur springs: Beck, 41a; Ontario Co.: Barton, 05a  
 Sinking water table, effects on springs: Hopkins (T C), 10a  
 Taconic quadrangle: Taylor (F B), 05  
 Tully: Hollister, 05  
 Watkins Glen quadrangle: Tarr, 05  
 New York City, geology: Berkey, 09  
 New York City folio (no. 83): Merrill (F J H), 02  
 New York series: Chadwick, 08  
 New York system: Emmons (E), 46e; nomenclature: Clarke (J M), 04a  
 Niagara Falls.  
   Age: Martin (L), 15c; Spencer (J W), 94b, 07, 08a, 15; Wright (G F), 98d, 99a  
   Bibliography: Haskell, 13  
   Crest line, survey: Hall (W C), 07  
   Duration: Spencer (J W), 94e  
   Erosion: Wright (G F), 02  
   Evolution of: Gilbert, 08c; Spencer (J W), 10c  
   General: Bakewell, 30; Ballou, 82; Bigsby, 89; Currie, 01; Emmons (S F), 93; Geddes, 26; Gibbes, 57; Gilbert, 86a, 90a, 95; Grabau, 01, 13; Gunning, 72; Hall, 42, 43; Hallett, 84; Holley, 72, 74; Hyatt, 69; Kindle, 13c; Lyell, 43; Marcou, 65; Pohlman, 83, 89a; Robertson (F), 05; Rogers (H D), 35b; Spencer (J W), 95; Taylor (F B), 13a; Tyndall, 73; Upham, 03f; Vespuccius, 41; Wright (G F), 84e  
   Geologic history: Hitchcock, 01; Pohlman, 89a; Taylor (F B), 95d; Upham, 05d  
   Geological chronometer: Grant (C C), 01b; Gregory (J W), 08a; Spencer (J W), 94h; Wright (G F), 08c  
   Geology: Shaler, 93c



## Niagara Falls—Continued.

Glacial and postglacial phenomena: Belt, 75  
 Interruption in flow in 1909: Spencer (J W), 10a  
 Measure of postglacial time: Upham, 08a  
 Origin: Featherstonhaugh, 31a; Upham, 96m  
 Recession, rate: Bakewell, 57; Bogart, 91; Claypole, 89c; Desor, 53a, 54; Fairholme, 34; Garrett, 85; Gibbes, 57a; Gilbert, 07; Hall (J), 57g; Hall (W C), 07; Hallett, 84; Holley, 74; Lyell, 42b; Robb, 60; Spencer (J W), 98c, 07, 07a, 08c, g, 16; Wesson, 85; Woodward (R S), 86

Rock falls: Claypole, 89c

Soundings: Spencer (J W), 08, 08f

Spoliation: Spencer (J W), 08h

Work of the Falls: Spencer (J W), 10

Niagara folio, New York (no. 190): Kindle, 13c

Niagara Gorge: Buck, 94; Upham, 01; Wright (G F), 84 e; as a chronometer: Upham, 94k; and Saint Davids channel: Upham, 98; time measures: Taylor (F B), 14.

Niagara River: Wright (G F), 84b; age: Spencer (J W), 87b; history: Gilbert, 90a, 01; Pohlman, 83; Spencer (J W), 95c, 96, 98; old channel: Scovell, 91; whirlpool and rapids: Bakewell, 47; Whirlpool Rapids gorge, origin: Taylor (F B), 98

Niagara formation: Hall, 74b

Niagara shales: Ringueberg, 88

## Nicaragua.

Chontales mining district: Feust, 12

General: Crawford, 90, 91e; Flint, 90

Neolithic man: Crawford (J), 91a

San Juan Valley: Merz, 07

Viejo Range: Crawford (J), 91b

*Economic geology.*

Gold: Carter (T L), 10, 10a, 11a

Chontales mining district: Feust, 12

eastern Nicaragua: Gottschalk, 03

Matagalpa district: West, 09a

Mosquito coast: De Kalb, 94

Piz-Piz district: Connelly, 10

Segovia region: Miller (H H), 97

Geology and vein phenomena: Carter (T L), 10a

Matagalpa district: West, 09a

Northeastern Nicaragua: Crawford (J), 93, 93a

Silver, Matagalpa district: West, 09a

*Historical geology.*

Canal route: Hayes, 99, 99a, d

General: Calderón y Arana, 82; Crawford (J), 91e, 92, 92c; Johnson (G H), 84; Sapper, 05a

Northeastern Nicaragua: Crawford (J), 93, 93a; Hershey, 12a

Piz-Piz district: Connelly, 10

*Paleontology.*

Human footprints; Brinton, 88; Crawford (J), 91a, d; Flint, 90; Johnson (G H), 84

Toxodon, etc.: Leidy, 86c

*Petrology.*

Canal route: Ransome, 99

*Physical geology.*

Cerro Viejo: Crawford (J), 95

Coseguina Volcano: Crawford (J), 92a; eruption, 1835: Galindo, 35

## Nicaragua—Continued.

*Physical geology—Continued.*

Earthquakes: Crawford (J), 91, 92b, 98, 02; Dutton, 91a; Jones (J O), 03; list: Crawford (J), 02a

Las Pilas: Sapper, 99a

Masaya: Sapper, 14, 16; eruption, 1902: Sapper, 04

Momotombo, eruption: Sapper, 05b, 16

Volcanoes: Chamberlin (P W), 03; Dutton, 91a; Jones (J O), 03

Volcanic eruptions: Crawford (J), 02b; list: Crawford (J), 02a

*Physiographic geology.*

Canal region: Hayes, 99, 99a, b, d

Cerro Viejo: Crawford (J), 95

Continental divide: Hayes, 93

Coseguina: Crawford (J), 92a

Drift deposits: Belt, 74; Dana (J D), 74a

General: Crawford (J), 92

Glacial epoch: Crawford (J), 91c

Lake Nicaragua: Hayes, 00; Shimek, 01c

Lake region: Hayes, 99c

Lakes: Calderon y Arana, 82

Northeastern Nicaragua: Crawford (J), 93

## Nickel.

California: Boalich, 18a

Canada: Coleman, 10h; Young (G A), 09

General: Charleton, 94; Mickle, 91; R Ont Nickel Comm, 17; Wharton, 97

Genesis: Packard (R L), 94b

Historical sketch: Austin, 95

Idaho, Lemhi Co.: Umpleby, 13

Kentucky, western: Fohs, 07

Lateritic ore deposits: Miller (W G), 17a

New Brunswick: Ells, 08a

North Carolina, Webster: Barlow, 06b

Occurrence, geologic distribution and genesis: Argall, 95

Ontario: Coleman, 10d; Ingall, 06b; R Ont Nickel Comm, 17

Alexo deposit: Uglov, 11, 11a

Cobalt district: Bell (R), 06b; Courtis, 06; Rickard (T A), 07a

Miller Lake and Everett mines: Barlow, 09c

Sudbury district: Barlow, 06c; Bateman, 17;

Bell (R), 91b; Browne, 06; Coleman, 05,

07d, 08, 12, 13, 13f, 17a; Hixon, 06b, c;

Hore, 12c; Howe, 14; Roberts (H M), 18;

Stewart (L) 08; Stokes (R), 07b; Stutzer,

08; Thomas (K), 12b; Thompson (R) 06a

Sudbury nickel ores, origin: Gregory (J W), 08b; St. Clair, 14

Oregon: Stafford, 04; Nickel Mountain: Kay, 07

Quebec: Dresser, 09c

South Carolina: Sloan, 08

United States: U S G S, 83

Virginia: Watson, 07b,e

Washington, San Poil district: Bancroft (H), 12

Nickel Mountain, Oreg.: Kay (G F), 07

Nicola coal basin, B. C.: Ells, 05; Roberts, 10

Nicola-Coldwater coal beds, B. C.: Evans (H F), 05

Nicollet, J. N., biography: Winchell (N H), 91d; Winchell (H V), 94a

Nicollet, Jean, biography: Winchell (H V), 94a

Niles, W. H., biography: Barton, 11

Niobrara chalk: Calvin, 94b



**Niobrara group:** Sternberg, 81e  
**Nipigon Basin, Ont.:** Wilson (A W G), 10  
**Nipigon district, Ont.:** Coleman, 09  
**Nisqually Glacier, Mount Rainier:** Le Conte (J N), 06  
**Nita crevasse:** Johnson (L C), 91  
**Nitrate.**  
     **California:** Bailey (G E), 02; Oehsenius, 02; Turner (H W), 07a  
     **General:** Gale, 12  
     **Kentucky:** Brown (S), 09  
     **in cave earths:** Nichols, 01; Rogers (W B), 56a; origin: Hess (W H), 00  
     **Montana, Melrose:** Richards (R W), 13a, 14  
     **Nevada, Humboldt Co.:** Van Wagenen, 02  
     **Oregon, southeastern:** Williams (I A), 18  
     **Origin:** De Kalb, 16; in cliffs and ledges: Gale, 17a  
     **Tennessee, cave deposits:** Glenn, 18a  
     **United States:** U S G S, 83  
     **Virginia:** Watson, 07e  
**Nitrogen, abstraction from atmosphere:** Vanuxem, 27  
**Niukluk River basin, Alaska:** Smith (P S), 07  
**Nivation.**  
     **Alaska and Yukon:** Cairnes, 12d  
     **northern Greenland:** Ekblaw, 18  
**Nizina district:** Moffit, 11a  
**Noatak-Kobuk region, Alaska:** Smith (P S), 13a  
**Nome region, Alaska:** Moffit, 07, 13  
**Nomenclature.**  
     **Agnotozoic:** Chamberlin (T C), 88a  
     **Algonkian:** Lawson, 02a; Leith, 13a  
     **Alluvial-fan formations:** Lawson, 13a  
     **Amorphous minerals:** Rogers (A F), 17  
     **Anticlinorium and synclinalorium:** Rice (W N), 96  
     **Aphrolith and dermolith:** Jagger, 17c  
     **Archean:** Frazer, 88a; Lanc, 94a; Canada: Lawson, 90b  
     **Bedford:** Prosser, 01a  
     **Blocks and segments:** Udden, 13a  
     **Bradfordian:** Bather, 04  
     **Buena Vista, use of term:** Prosser, 06a  
     **Cambrian:** Walcott, 10, 15  
         **St. Francois Mountains:** Keyes, 01d  
     **Cambrian and Silurian:** Dana (J D), 90b; Miller (S A), 75b  
     **Canadian formations:** Ami, 00a; Ells, 99a  
     **Capitals for names of formations:** Gilbert, 84d  
     **Carboniferous:** Chance, 81b; Keyes, 96f, 09p  
     **Cincinnati period:** Hitchcock (C H), 79b  
     **Classification, dual nomenclature:** Williams (H S), 94  
     **Coal Measures, western interior basin:** Keyes, 00h  
     **Coals west of Mississippi River, names:** Keyes, 01o  
     **Connecticut sandstone group:** Hitchcock (C H), 95  
     **Dermolith:** Jagger, 17c  
     **Des Moines and Missourian misused:** Bain, 06c  
     **Diastrophic disturbances:** Chamberlin (R T), 14  
     **Dinoceras and Brontotherium:** Cope, 79s  
     **Dip and pitch:** Raymond (R W), 08

## Nomenclature—Continued.

**Dip, pitch, hade:** Wilson (E B), 08  
     **Eruptive, use of term:** Lahee, 14e  
     **Esker or kame drift:** Kinahan (G H), 85  
     **Fanglomerate:** Lawson, 13a  
     **Faulting:** Ransome, 06a; Reid (H F), 12b, 13a; Stevens (B), 14  
     **Fusulinas:** Girty, 14  
     **Geography and geology, relation:** Davis (W M), 12a  
     **Geologic formation names:** Dawson (G M), 99; Chamberlin (T C), 01; Keyes, 98; Marcou, 88, 92; Powell, 82; Weeks, 99a, 02a; Willis, 01  
     **Geologic names, status of:** Keith, 09  
     **Geologic nomenclature:** Frazer, 87d; Williams (H S), 94  
     **Geologic surfaces:** Johnson (R H), 15b  
     **Geological terms:** Grabau, 09c; glossary: Cornett, 84; Lee (S E), 86  
     **Glacial epochs in Rocky Mountains area:** Atwood, 12a  
     **Goodnight formation:** Cummins, 95  
     **Homocline and monocline:** Daly (R A), 16  
     **Hudson River group:** Hall, 78a  
     **Igneous rocks:** Cross, 12a  
     **Illinois, formations:** Meek, 66  
     **Imbricate structure:** Hobbs, 94b  
     **Iowa, geologic section:** Keyes, 12e  
     **Kaineontologie:** McGee, 82a  
     **Kansas, Coal Measures:** Haworth, 08a; Permian: Cragin, 96  
     **Kaskaskia group:** Miller (S A), 79b  
     **Keweenawan igneous rocks:** Winchell (A N), 08  
     **Lake Superior copper-bearing rocks:** Grant (U S), 95  
     **Lake Superior formations:** Willmott, 02  
     **Laramie:** Peale, 09; Veatch (A C), 07  
     **Laurentian:** Hitchcock (C H), 90; James (J F), 90, 90c; Wadsworth, 81d; and Champlain: Marcou, 90d  
     **Lavas, metamorphic:** Turner, 97b  
     **Lawrencean formation:** Billings, 57a  
     **Lithology:** Chamberlin (T C), 82a  
     **Lorraine group:** Hitchcock (C H), 79b  
     **Mammalia, molar cusps:** Osborn, 88c  
     **Mantle rock:** Dryer, 03  
     **Maps:** Selwyn, 83a  
     **Metamorphic rocks:** Miller (W J), 17b  
     **Mineralogy:** Chester (A H), 92; Dana (J D), 37a, 67a; Washington, 12a  
     **Minerals:** Wherry, 14b, 17g; colloid: Wherry, 13a; native element: Wherry, 17d  
     **New terms in geology:** Branner, 97d  
     **Newark:** Gilbert, 94; Hitchcock (C H), 90; Lyman, 94b; Russell (I C), 91b, 95b  
     **New York series:** Clarke (J M), 99i, 04a  
     **Nonmetallic minerals:** Merrill (G P), 01  
     **Nontronite:** Bergeat, 09a  
     **Ohio:** Prosser, 03  
     **Ontario, Michipicoten iron ranges:** Coleman, 06; drift deposits: Coleman, 09c  
     **Ophitic and related terms in petrography:** Winchell (A N), 10  
     **Ophitic texture:** Lane, 10c  
     **Orange sand, Lagrange, and Appomattox:** Hilgard, 91



## Nomenclature—Continued.

- Ordovician: Hunt, 91a  
 Ore, definition: Peele, 13  
 Osage vs. Augusta: Weller, 98e  
 Paleontology: Cope, 85i; Matthew (W D), 13a  
 Paleozoic: Hall, 80; Marcou, 89b  
 Pennsylvania, Pennsylvanian: Chance, 85b; White (I C), 85b  
 Permian: Keyes, 06e; and Dyas: Marcou, 62  
 Petrographic terms for field use: Johannsen, 11  
 Physiographic forms: Davis (W M), 13b  
 Physiographic terms, new: Cairnes, 12c  
 Poikilitic and micropoikilitic: Williams (G H), 93d  
 Porphyritic rocks: Dana (J D), 86d  
 Pre-Cambrian: Adam (F D), 07; Coleman, 06a; Keyes, 17i; Schuchert, 16c; Sederholm, 13b; Selwyn, 92; Van Hise, 08; Woodworth, 13; Winchell (A), 91; Winchell (N H), 91b, 01c  
 Pre-Silurian formations: Winchell (N H), 93d  
 Quantitative classification of igneous rocks, modifications: Cross, 12b  
 Quebec: Am G, 90c  
 Regolith: Dryer, 03  
 Rock types, Virginia: Watson, 13h  
 Rocks, crystalline: Jackson (A W), 82; igneous: Cross, 03; Johannsen, 17  
 St. Maurice for "Lower Claiborne," Louisiana: Harris, 10a  
 Segment and segmentation: Adams (G I), 13  
 Seismological reports: Woodworth, 11  
 Sierran: Turner, 00f  
 Silurian: Dana (J D), 89c; Miller (S A), 81e  
 Michigan, Ohio, and New York: Lane (A C), 09d  
 Silurian and Cambrian: Hunt, 75  
 Stratigraphic: Chamberlin (T C), 07a; Dana (J D), 74b; Eaton (A), 28b; Gilbert, 04g; Keyes, 98i; Lesley, 75a; Newberry, 78g; Owen (R), 81a, 82; Williams (H S), 93a, 01; Winchell (N H), 82d  
 Superposed strata: Rogers (H D), 57a  
 Surficial formations: Shaw (E W), 18  
 Synclinerium and anticlinorium: Rice (W N), 06b  
 Taconic: Marcou, 87; Miller (S A), 88; Walcott, 88; Winchell (A), 88c; Winchell (N H), 88e  
 Time scale: Williams (H S), 93, 93b  
 Tongue: Stephenson, 17  
 Trilobita: Raymond (P E), 13; Cryptolithus versus Trinucleus: Raymond (P E), 13a  
 Types: Burling, 12b  
 Unconformities: Crosby, 12  
 Vertebrata, preoccupied names: Hay (O P), 99d, e  
 Zirkelite: Wadsworth, 98b  
 Nomini folio, Md.-Va. (no. 23): Darton, 96a  
 Nomographic solutions of certain stratigraphic measurements: Palmer (H S), 16  
 Nonmetallic minerals: Merrill (G P), 04  
 Norfolk folio, Va.-N. C. (no. 80): Darton, 02  
 Norian of the Northwest: Winchell (N H), 93  
 North America: Russell, 04; development: Le Conte, 86a  
 North Atlantic basin: Reade, 86  
 North Atlantic Ocean, age: Hull, 84, 86  
 North Carolina.  
 Atlantic slope: Ruffin, 61  
 Bibliography of geology, mineralogy, and geography: Laney, 09; Coastal Plain: Miller (B L), 12c  
 Chapel Hill region: Olmsted, 20; Smith (J E), 14  
 Conservation and utilization of natural resources: Pratt, 10  
 Cranberry district: Keith, 97a  
 Eastern N. C.: Mitchell, 28  
 General: Dickson, 21; Eights, 58; Fulton (H), 19; Hodge (J T), 41; Kerr, 67; Mitchell, 05  
 Geologic diary: Mitchell, 05  
 Geologic history of western N. C.: Pratt, 13a  
 Geological surveys: Holmes (J A), 89  
 Natural walls: Beckwith, 22  
 Paleotrochis: Cobb, 04; Diller, 99a; Emmons (E), 56a; Marsh, 68; White (C H), 94  
 Soil geology: Kerr, 83, 84  
 Soils, petrography: Plummer, 15  
 Survey, reports: Holmes (J A), 93, 94; Kerr, 67, 69, 75; Pratt, 07  
 Waterpower, geologic distribution: Holmes (J A), 99  
 Western N. C.: Britton (N L), 86; Willcox, 74  
*Economic geology.*  
 Agalmatolite, Deep River: Jackson, 56h  
 Asheville quadrangle: Keith, 04  
 Auriferous slate deposits: Mell, 81  
 Barite: Watson (T L), 15  
 Barytes industry: Judd (E K), 07b  
 Building stones: Dickinson, 03; Hawes, 84; Lewis (J V), 93  
 Building and ornamental stones: Pratt, 06b; Watson, 06e  
 Cement materials: Eckel, 13  
 Cherokee Co.: Blake (W P), 61  
 Chromite: Pratt, 98c, 99, 00b, 05  
 Cid mining district, Davidson Co.: Pogue, 10  
 Clay: Holmes (J A), 95; Ries, 97d  
 Coal: Chance, 85; Hale (P M), 83; Jackson, 53b  
 Dan River field: Emmons (E), 52, 53; Nitze, 91; Stone (R W), 12a, 14a; Woodworth, 02  
 Deep River field: Chance, 85a; Emmons (E), 56, 57; Jackson, 54b, f, 56g, 57, 57f; Johnson (W R), 51a, 53; Rogers (W B), 57; Tuttle, 94a; Wilkes, 59; Woodworth, 02  
 western N. C.: Phillips (W B), 95  
 Cobalt, Gaston Co.: Wurtz, 59  
 Copper: Eames, 07; Jackson, 53b, e, 54c; Ricketts, 83; Thompson (A P), 13; Weed, 02e, 06, 11  
 Ashe Co.: Hunt, 73e, 74h; Olcott, 75  
 Charlotte, Mecklenburg Co.: Leeds, 54a  
 Gold Hill district: Laney, 08, 10; Ledoux, 00; Nicholas, 07a  
 Guilford Co.: Jackson, 58a  
 Union mines: Nicholas, 07  
 Virgilina district: Laney, 08a, 11; Phillips (W B), 99; Watson, 02



## North Carolina—Continued.

*Economic geology—Continued.*

Corundum: Holmes (J A), 96; Lewis (J V), 95, 96, 96a; Pratt, 98b, 00a, 05; Shepard, 72a; Smith (C D), 75, 75a; Smith (J L), 73a; Stone (A M), 98

Macon Co.: Leidy, 72c; Raymond, 79a  
origin: Chatard, 87

Cranberry iron-ore mine: Cameron, 11

Cranberry quadrangle: Keith, 03

Davidson Co.: Booth, 41a

Deep River valley: Emmons (E), 57

Emeralds: Hidden, 82a, 83; Sterrett, 12

Gems: Kunz, 07

General: Dieffenbach, 54; Eights, 58; Emmons (E), 52; Hanna, 90; Kerr, 69, 73, 75, 82, 88; Mitchell, 27; Olmsted, 24, 27; Pratt, 01a, 11, 14

Gold: Chance, 82d; Crosby, 07; Dickson, 34; Dieffenbach, 54; Eaton (A), 30b; Gibbon, 45; Graton, 06a; Hanna, 82; Johnson (W R), 51; Kerr, 80a, 81a, 82a, 88; Leeds, 54; Lewis (H C), 84c; Lieber, 60a; Lyon, 09; Mitchell, 29; Moore (F), 02; Nitze, 96, 97; Partz, 54; Peck, 32; Pratt, 02h; Olmsted, 25; Ricketts, 83; Rothe, 27, 28; Smith (F L), 37; Weed, 01e; Welch, 09

central slate belt, genesis: Nitze, 97d

Charlotte, Mecklenburg Co.: Leeds, 54a

Cherokee Co.: Blake (W P), 60e

Cid mining district: Pogue, 10

Coggins mine, Montgomery Co.: Pratt, 15

Gaston Co.: Lieber, 58

Gold Hill district: Laney, 08, 10

McDowell Co.: Ellery, 54

Montgomery Co.: Jackson, 58a; Morehead, 91

South Mountain region: Pratt, 01c

Granites: Watson, 04d, g, 10, 10a

Hiawasse Valley: Colton, 88

Iron: Hale (P M), 83; Kerr, 88; Nitze, 93, 93a; Willis, 86a

Cranberry district: Cameron, 11; Keith, 03a

Limonite, Cherokee Co.: Nitze, 97c

magnetic ores, Ashe Co.: Nitze, 92a; Pratt, 15a; Granville Co.: Nitze, 92b

magnetite, Cranberry: Kimball, 97b; Stokes Co.: Nitze, 92

titaniferous, Greensboro: Lesley, 71b

Kaolin: Holmes (J A), 95

Lead, Cid mining district: Pogue, 10

McDowell Co.: Ellery, 54

Manganese: Harder, 10

Marble: Pratt, 02i

Marl: Emmons (E), 58

Mecklenburg Co.: Shepard, 53b

Mica: Kerr, 80, 85c; Phillips, 88, 88a; Simonds, 96a; Sterrett, 07, 10, 11

Mineral resources: Genth, 72; McGehee, 83; western N. C.: Blake (W P), 96b

Mineral waters: Pratt, 08a

Monazite: Böhm, 06; Mezger, 96; Nitze, 95, 95a, b, 96a, 97a; Pratt, 09, 09a, 13, 16; Sterrett, 07a, 08a

Mount Mitchell quadrangle: Keith, 05a

Nantahala quadrangle: Keith, 07

Nickel, Gaston Co.: Wurtz, 59; Webster: Barlow, 06b; Emmens, 92a

## North Carolina—Continued.

*Economic geology—Continued.*

Peat deposits: Davis (C A), 08b

Phosphate: Dabney, 84, 84a; Phillips (W B), 84; Winslow, 85; Duplin Co.: Phillips (W B), 83

Pisgah quadrangle: Keith, 07a

Placer mining industry: Welch, 09

Platinum: Venable, 92a

Precious stones, Alexander Co.: Hidden, 87c

Pyrites: Winslow, 86

Pyrophyllite: Hafer, 13; Pratt, 00

Road materials: Holmes (J A), 92, 93a

Roan Mountain quadrangle: Keith, 07b

Silver, Cid mining district: Pogue, 10

Silver-lead, Davidson Co.: Jackson, 58

Slate, Chapel Hill: Eaton (H N), 08, 10

Soapstone: Mell, 82

Talc: Keith, 03c; Pratt, 00, 02i

Tin deposits: Ball (S M), 09a; Blake, 85e; Graton, 05, 06a; Hess, 06c; Pratt, 04; Kings Mountain, Cleveland Co.: Dabney, 84b, c; Furman, 89; Keith, 17; Ulke, 94; Van Ness, 87

Union Co.: Shepard, 53b

Union copper mines: Nicholas, 07

Virgilina district: Laney, 17; outcrop map: Laney, 08a

Western N. C.: Christy, 56, 58; Smith (C D), 75a

Zinc, Cid mining district: Pogue, 10

Zircon: Pratt, 16; Venable, 92

*Historical geology.*

Appalachians: Bradley, 75; Elliott (J B), 83

Appomattox formation: McGee, 90

Asheville quadrangle: Keith, 04

Boring, Wilmington: Holmes, 00

Chapel Hill: Smith (J E), 14, 14a

Chapel Hill slate, origin: Eaton (H N), 10

Charlotte: Mezger, 91

Chatham series, Deep River: Emmons (E), 59

Coastal Plain formations: Clark (W B), 09a, 12, 12a; Stephenson, 12a; Tertiary: Miller (B L), 12d

Conglomerate and pebble beds: Holmes (J A), 90

Core Bank: Cobb, 07

Corundum Hill: Chatard, 87

Cranberry district: Keith, 96e

Cranberry quadrangle: Keith, 03

Cretaceous formations: Berry, 09e; Stephenson, 09; Wilmington: Stanton, 91

Cretaceous and Tertiary: Conrad, 71a

Cretaceous-Tertiary unconformity: Holmes (J A), 00b

Dan River coal field: Stone (R W), 12a

Davidson Co.: Pogue, 09b

Deep River district: Jackson, 54b; Wilkes, 59

Ellijay quadrangle: LaForge, 13

Eocene: Kerr, 85, 85b

Erosion intervals in Tertiary: Miller (B L), 10

General: Darton, 96d; Emmons (E), 52, 56, 57a, 58a; Genth, 72; Hanna, 90; Kerr, 67, 69, 70, 75, 82; Mitchell, 27, 42; Olmsted, 24, 27; Rothe, 27

Gold region: Mitchell, 29

Greeneville quadrangle: Keith, 05



## North Carolina—Continued.

*Historical geology*—Continued.

- Greensand deposits: Ashley, 17a  
 Hiawassee Valley: Colton, 88  
 Kings Mountain district: Keith, 17  
 Knoxville quadrangle: Keith, 95  
 Mesozoic: Jones (T R), 63; Kerr, 75a; Rogers (W B), 54; Stephenson, 07  
 Miocene: Lyell, 45a  
 Montgomery Co.: Emmons (E), 55a  
 Mount Mitchell quadrangle: Keith, 05a  
 Murfreesboro stage of east coast Miocene: Olson, 17  
 Nantahala quadrangle: Keith, 07  
 Norfolk quadrangle: Darton, 02  
 Orange Co.: Smith (J E), 17c  
 Ordovician: Bradley, 74c  
 Piedmont: Smith (J E), 16b  
 Pisgah quadrangle: Keith, 07a  
 Pleistocene terracing in Coastal Plain: Johnson (B L), 07  
 Pliocene, Orange Co.: Smith (J E), 17b  
 Quaternary: Burbank, 74  
 Roan Mountain quadrangle: Keith, 07b  
 Sand hill country: Holmes (J A), 93b  
 South Mountain region: Pratt, 01c  
 Taconic and Huronian rocks: Nitze, 97b  
 Tertiary: Conrad, 67; Heilprin, 84a  
   Cape Fear River region: Clark (W B), 90b  
   correlation: Vaughan, 18d  
   post-Eocene: Heilprin, 82b  
   Wilmington: Stanton, 91  
 Tertiary erosion intervals: Miller (B L), 10  
 Virgilina district: Laney, 17  
 Western N. C.: Smith (C D), 75a

*Mineralogy*.

- Alexander Co.: Rath, 86c  
 Anthophyllite: Pratt, 98a; Macon Co.: Penfield, 90c  
 Apatite crystal, Alexander Co.: Prindle, 94  
 Auerlite, Henderson Co.: Hidden, 88b, d  
 Beryl (emerald): Pratt, 98a; Alexander Co.: Rath, 86b  
 Brookite, Burke Co.: Robinson (H H), 01  
 Cassiterite: Headden, 06  
 Chapel Hill region: Fry, 11a  
 Chromite: Pratt, 98c, 99  
 Cobalt, Gaston Co.: Wurtz, 59  
 Copper mineral, Cabarras Co.: Genth, 53a  
 Corundum: Pratt, 05; Shepard, 72a  
 Cyanite, zircon, and anorthite: Pratt, 98  
 Diamond: Shepard, 46; McDowell Co.: Kunz, 87m  
 Dogtooth spar, Gander Hall: Phillips (W B), 85  
 Edisonite, Polk Co.: Hidden, 88  
 Emerald, Alexander Co.: Hidden, 86c; Bakersville: Kunz, 94a  
 Enstatite: Pratt, 98a  
 Famous mineral localities, gem regions: Trudell, 18  
 Fergusonite, Burke Co.: Seamon, 82a  
 Fluid-bearing quartz crystals, Alexander Co.: Hidden, 82b  
 Garnets, flattened: Mathews, 95a  
 Gems: Kunz, 07  
 General: Genth, 75a, 81a, 85, 91; Hidden, 90b; Pratt, 97b; Willcox, 76

## North Carolina—Continued.

*Mineralogy*—Continued.

- Genthite, Webster, Jackson Co.: Dunnington, 72  
 Hatchettolite, Mitchell Co.: Allen (O D), 77  
 Hiddenite, Alexander Co.: Hidden, 83a, 86c; Smith (J L), 81  
 Klaprothine (lazulite): Chapman (E J), 61a  
 Lucasite, Macon Co.: Chatard, 86  
 Macon Co.: Hidden, 98c  
 Mineral localities: Hidden, 81b  
 Meteoric iron (?), Rutherfordton: Shepard, 59a  
 Meteorites: Kunz, 90h; Venable, 90a  
   Alexander Co.: Bailey (S C H), 91  
   Asheville: Shepard, 39  
   Bridgewater, Burke Co.: Kunz, 90, 90b  
   Cabarras Co.: Shepard, 50  
   Cid, Davidsón Co.: Pratt, 01b, 1  
   Colfax township, Rutherford Co.: Kunz, 90c  
   Cross Roads, Wilson Co.: Howell, 93a  
   Deep Springs Farm, Rockingham Co.: Cohen, 92  
   Ellenboro, Rutherford Co.: Eakins, 90a  
   Ferguson, Haywood Co.: Kunz, 90, 90d  
   Forsyth Co.: Schweinitz, 96  
   Guilford Co.: Shepard, 41  
   Haywood Co.: Shepard, 54  
   Hendersonville: Glenn, 04b; Merrill (G P), 07a  
   Lick Creek, Davidson Co.: Hidden, 80a  
   Linnville Mountain, Burke Co.: Cohen, 92; Kunz, 88b  
   Locust Grove, Henry Co.: Cohen, 97  
   Madison Co.: Burton, 76; Smith (J L), 60  
   Murphy, Cherokee Co.: Cohen, 92; Ward (H L), 99b  
   Nash Co.: Smith (J L), 75  
   Persimmon Creek, Cherokee Co.: Cohen, 04b; Klein, 04; Tassin, 04  
   Rich Mountain: Merrill (G P), 07b  
   Rockingham Co.: Genth, 70; Smith (J L), 77; Venable, 90  
 Mica crystals: Harn, 96  
 Monazite: Pratt, 13; Alexander Co.: Dana (E S), 82  
 Nickel, Gaston Co.: Wurtz, 59  
 Niobate, Mitchell Co.: Seamon, 82b  
 Octahedrite, Burke Co.: Robinson (H H), 01  
 Peridotite areas: Pratt, 05  
 Polycrase: Hidden, 90, 91  
 Purpurite, Gaston Co.: Graton, 05a  
 Quartz: Rath, 85d, i, 87  
   Alexander Co.: Pogue, 12; Rath, 84b, 85g, 86h  
   Burke Co.: Rath, 85c, f  
   Emerald mine: Miers, 93  
 Rare minerals: Hidden, 81  
 Rhodolite: Hidden, 98  
 Rhondonite, Jackson Co.: Chester (A H), 88  
 Ruby, Cowee district: Judd, 99; Macon Co., crystallography: Pratt, 99b  
 Samarskite, Mitchell Co.: Allen (O D), 77; Dana (E S), 76b; Willcox, 75  
 Silver, native: Kunz, 99  
 Sperrylite, Macon Co.: Hidden, 98b  
 Spessartite, Yancey Co.: Koenig, 76c  
 Spodumene, Alexander Co.: Dana (E S), 81



## North Carolina—Continued.

*Mineralogy*—Continued.

- Sundry minerals: Hidden, 82; Hunter, 53;  
Olmsted, 22  
Surry Co.: Lewis (H C), 80i  
Talc, Swain Co.: Adger, 72  
Tantalite, Yancey Co.: Koenig, 76a  
Wellsite, Clay Co.: Pratt, 97  
Xenotime: Hidden, 93b  
Zircon, twinned crystals: Hidden, 98a  
Zirconite, Buncombe Co.: Vanuxem, 23

*Paleontology*.

- Araucarian remains: Berry, 08a  
Areas: Sheldon, 17  
Caneellaria, Dauphin Co.: Johnson (C W), 04  
Clepsysaurus, Chatham Co.: Emmons (E), 59a  
Coastal Plain: Clark (W B), 12  
Craven Co.: Croom, 34  
Cretaceous: Gabb, 77; Mollusca: Conrad, 75a  
Cretaceous floras: Berry, 07b, e, 09e, 10a, m  
Deep River coal field: Emmons (E), 56; Jackson, 54b  
Dismal Swamp Mollusca and diatoms: Woolman, 98  
Dromatherium, Triassic: Osborn, 87  
Duplin fauna: Gardner (J A), 15  
Echinoidea: Conrad, 65b  
Foraminifera, Coastal Plain: Cushman, 18  
Fulgur: Conrad, 53  
General: Emmons (E), 58a  
Horse: Leidy, 71c  
Lenoir Co.: Limber, 41  
Liriodendron, Deep River beds: Cobb, 04b  
Marl beds: Emmons (E), 58  
Mastodon: Leidy, 71c  
Mesoteras: Cope, 70m  
Mesozoic flora: Fontaine, 83, 00  
Microconodon, Triassic: Osborn, 86, 87  
Mid-Cretaceous species of *Torрея*: Berry, 08  
Miocene: Olsson, 16  
Mollusca, Duplin Co.: Conrad, 40c  
Miocene: Conrad, 68, 72a  
Neocene: Olsson, 14  
Pliocene: Wagner, 39  
Tertiary: Tuomey, 52  
Plants: Heer, 57  
Pleistocene flora: Berry, 07c, 09b  
Reptilia, Sampson Co.: Cope, 69d  
Rhaetic flora, Moncure shales: Cobb, 06c  
Sus, Miocene, Wilson Co.: Cope, 73zf  
Tapir, tooth: Hays, 52  
Taxodium, Quaternary: Holmes (J A), 85  
Tertiary fossils: Conrad, 41a, 43a  
Triassic Mammalia: Osborn, 87b  
Triassic wood: Knowlton, 00a  
Vertebrata: Cope, 71q, 75g; Leidy, 56k; Chatham Co.: Leidy, 59e  
Waccamaw fauna: Gardner (J A), 15  
Wilmington: Brown (A P), 12a  
Yorktown fauna: Gardner (J A), 15

*Petrology*.

- Chapel Hill micropegmatite: Eaton, 08a  
Chapel Hill slate: Eaton, 08  
Cid mining district, Davidson Co.: Pogue, 10  
Corundum: Lewis (J V), 96; Pratt, 99a  
Diorites, Chapel Hill stock: Smith (J E), 16, 17a  
Dunite beds: Julien, 83a

## North Carolina—Continued.

*Petrology*—Continued.

- Eruptive rocks: Lugeon, 18  
Gabbro-diorite, Davie Co.: Watson, 04e  
Gold Hill district: Laney, 10  
Granites: Watson, 04d, 10a; Chapel Hill: Eaton (H N), 09  
Igneous rocks, Mount Collier: Smith (J E), 15  
Itacolumite: Shepard, 45a  
Leopardite, Mecklenburg Co.: Watson, 04b  
Olivine diabase, Davidson Co.: Pogue, 10a  
Olivine rocks: Wadsworth, 84e  
Pegmatite, genesis: Julian, 00c  
Peridotites: Pratt, 98b, 05  
Plutonic rocks of Chapel Hill: Fry, 11  
Rocks and minerals: Olmsted, 22  
Soils: Plummer, 15  
Unakite: Bradley, 74a  
Virgilina district: Laney, 17; Watson, 02b  
Voleanic rocks of Davidson Co.: Pogue, 09b

*Physical geology*.

- Asheville quadrangle: Keith, 04  
Bald Mountain: Kerr, 82b  
Coastline changes: Welch, 86a  
Cranberry quadrangle: Keith, 03  
Currituck Banks: Cobb, 06a  
Currituck Sound: Wieland, 97a  
Dunes along coast: Cobb, 04a, 06  
Earthquakes: Clingman, 75  
August 26: Finch (R H), 16  
Bald Mountain, Rutherford Co.: Bradley, 74b  
recent: Alvord, 74  
Frost, action in arranging earthy material: Kerr, 81a  
Frost drift: Kerr, 76  
Hatteras Inlet, opening: Welsh, 86  
Hatteras Island, changes: Cobb, 03  
Landslides: Holmes (J S), 17  
Metamorphism, Triassic coals, Egypt: Matthew (W D), 96  
Oyster reefs: Grave, 01  
Piedmont: Smith (J E), 16b  
Roan Mountain: Wetherby, 82

*Physiographic geology*.

- Appalachian region: Keith, 02  
Asheville region: Willis, 89  
Bald Mountain: Kerr, 82b  
Blue Ridge: Davis (W M), 03b, g; origin: Davis (W M), 03f  
Coast changes: Abert (S T), 76  
Coastal Plain: Clark (W B), 12, 12b  
Core Bank: Cobb, 07  
Cuspate capes: Abbe, 95  
Dismal Swamp: Shaler, 90  
Drainage changes: Weaver, 97  
Eastern N. C.: Kerr, 73a  
Fayetteville: Fry (W H), 10  
General: Cobb, 97; Kerr, 75, 81, 84; Smith (J E), 16a  
Hatteras region: Kerr, 84b  
Hominy Creek: Harris (H L), 93  
Kings Mountain district: Cobb, 94  
Oyster reefs: Grave, 01  
Sand hill topography: Cobb, 03  
Scarp, Blue Ridge, origin: Campbell (M R), 96c  
Terraces in Coastal Plain: Johnson (B L), 07



## North Carolina—Continued.

*Underground water.*

- Coastal Plain: Clark (W B), 12; Stephenson, 12b  
 Cowee and Pisgah quadrangles: Gale, 05  
 General: Darton, 96d; Fuller, 05h  
 Ground and deep waters: McCarthy, 07  
 Piedmont Plateau region: Holmes (J A), 96a  
 North Creek quadrangle, New York: Miller (W J), 14a

## North Dakota.

- General: Emmons (S F), 93  
 Geological reconnaissance: Douglass, 09a  
 Jamestown-Tower district: Willard, 09  
 Northern Pacific Railroad, country bordering: Newberry, 85d  
 Road materials: Hard, 13  
 Soils, Jamestown-Tower district: Willard, 09  
 southeastern N. Dak.: Willard, 04a  
 Tower quadrangle: Willard, 06d  
 Survey reports: Leonard, 04, 06c, 08, 12a; Wilder, 02a  
 Western N. Dak.: Wood (L H), 04

*Economic geology.*

- Bismarck quadrangle: Leonard, 12  
 Cement materials: Eckel, 13; northeastern N. Dak.: Barry, 08  
 Clay: Babcock, 01, 06, 14; Clapp (C H), 06, 07; Leonard, 06d, 07  
 General: Babcock, 01; Willard, 02  
 Gypsum: Darton, 04b  
 Lignite: Babcock, 99, 01, 14; Haseltine, 01; Leonard, 06a, 16b; Wilder, 02b, c, d, 05a, 06  
 Bismarck quadrangle: Leonard, 12  
 Cannonball River field: Lloyd, 14  
 Fort Berthold Indian Reservation: Pishel, 12; Smith (C D), 09a  
 Missouri, Heart, and Cannonball rivers: Wilder, 04  
 Missouri Valley: Burchard, 04a  
 origin: Wilder, 03a  
 Sentinel Butte field: Leonard, 09  
 southwestern N. Dak.: Leonard, 08a  
 Standing Rock Indian Reservation: Calvert, 14  
 Washburn field: Smith (C D), 09  
 western N. Dak.: Wood, 04  
 Williams Co.: Collier, 18b  
 Williston field, Williams Co.: Herald, 13  
 Natural gas: Leonard, 11a; Bottineau field: Barry, 08a  
 Nesson anticline, Williams Co.: Collier, 18b  
 Pembina region: Berkey, 05b  
 South central N. Dak.: Leonard, 12b  
 Southwestern N. Dak.: Leonard, 08a
- Historical geology.*  
 Bismarck quadrangle: Leonard, 12  
 Cannonball member of Lance formation: Lloyd, 15  
 Cannonball River lignite field: Lloyd, 14  
 Casselton quadrangle: Hall (C M), 05  
 Clay formations: Leonard, 06d  
 Coteaus of the Missouri: Willard, 04d  
 Cretaceous: Meek, 56d  
 Cretaceous and Tertiary formations: Leonard, 11  
 Cretaceous volcanic ash bed: Stanton, 17

## North Dakota—Continued.

*Historical geology—Continued.*

- Devils Lake region: Babcock, 02  
 Fargo quadrangle: Hall (C M), 05  
 Fort Berthold Indian Reservation: Pishel, 12  
 Fort Union beds: Wilder, 04b  
 Fox Hills sandstone and Lance formation: Stanton, 10a  
 General: Babcock, 01; Culver, 90; Hayden, 57, 62; Leonard, 04a; Willard, 02  
 Geologic formations of eastern N. Dak.: Willard, 06  
 Geologic history: Leonard, 08b, 17; eastern N. Dak.: Willard, 04b  
 Geologic map: Leonard, 11b, 13  
 Green River group(?), Sentinel Butte: White (C A), 83n  
 Hell Creek and Ceratops beds: Knowlton, 09  
 Jamestown-Tower district: Willard, 09  
 Killdeer Mountains: Quirke, 18  
 Lance formation: Knowlton, 11a  
 Laramie beds: Wilder, 04b  
 Lignite area: Wilder, 02b, c  
 Maple River, history: Willard, 06e  
 Nesson anticline, Williams Co.: Collier, 18b  
 Northeastern N. Dak.: Barry, 08  
 Pembina region: Berkey, 05b  
 South central N. Dak.: Leonard, 12b  
 Southwestern N. Dak.: Leonard, 08a  
 Standing Rock Indian Reservation: Calvert, 14  
 Tower quadrangle, geologic history: Willard, 06a
- Mineralogy.*  
 Meteorite, Stutsman Co.: Huntington, 90
- Paleontology.*  
 Horses: Douglass, 08b  
 Merycoidodonts: Douglass, 07a  
 Mollusca, Tertiary: Meek, 56c  
 Paleozoic, list: Bierbauer, 91  
 Rhinoceroses, Oligocene and Miocene: Douglass, 08a  
 Tertiary, Peno Creek: Evans (J), 54b  
 Tertiary flora: Leiberg, 89  
 Titanoides: Gidley, 17
- Physical geology.*  
 Valley filling: Collier, 18c
- Physiographic geology.*  
 Badlands: Tarr, 00a  
 Bismarck quadrangle: Leonard, 12  
 Coteaus of the Missouri: Willard, 04d  
 Devils-Stump lake region: Simpson (H E), 12  
 Eskers and kames, Barnes Co.: Hard, 13a  
 General: Leonard, 04a; Upham, 96f; Willard, 02  
 Glacial drift: White (C A), 84c; pre-Wisconsin: Leonard, 16a  
 Glacial Lake Agassiz: Hall (C M), 04; Leverett, 13e; Upham, 82, 87, 96, 96e  
 Hills, peculiar type: Willard, 06h  
 Killdeer Mountains: Quirke, 18  
 Little Missouri badlands: MacBride, 83  
 Moraines, Missouri Coteau: Todd, 85, 96  
 Northeastern N. Dak.: Barry, 08  
 Plateau region: Hibbard, 06c  
 Pleistocene drainage changes, western N. Dak.: Leonard, 16  
 Southwestern N. Dak.: Leonard, 08a



## North Dakota—Continued.

*Physiographic geology*—Continued.

Surface formation, southeastern N. Dak.: Willard, 04

Tower quadrangle, drift formations: Willard, 06f, g

Western N. Dak.: Wood (L H), 04

*Underground water.*

Artesian waters: Darton, 96e

Artesian wells: Underhill (F S), 90; Upham, 90b, 01c; eastern Dakota: Eldridge, 93a

Dakota artesian basin: Willard, 06c

Devils Lake region: Babcock, 02

Fargo quadrangle: Hall (C M), 05

General: Culver, 90

Jamestown-Tower district: Willard, 09

Northeastern N. Dak.: Barry, 08

Water supply: Willard, 04c; Cass, Barnes, and Ransom cos.: Willard, 08a; Tower quadrangle: Hibbard, 04

Northern Pacific Railroad, country bordering: Newberry, 85d

Northumberland Strait, geology: Ells, 94a

Northumberland volcanic plug: Cushing, 13

## Northwest Territories.

Coppermine River: Douglas, 13; Sandberg, 13; Tyrrell, 12

General: Camsell, 15; Richardson (J), 23, 28; Selwyn, 74a; Tyrrell, 14b

Great Bear Lake region: Bell (J M), 01, 01a

Great Slave Lake region, Mackenzie district: Bell (R), 00

Hudson Bay coast: O'Sullivan, 09

Hudson Bay region: Bell (R), 86; Low, 05; Tyrrell, 97

Lac Seul to Cat Lake: Wilson (A W G), 09b

Mackenzie basin: McConnell, 91

Mackenzie Mountains, reconnaissance: Keele, 10

Marble Island: Bell (R), 86

Pelly River basin: Keele, 09

Tazin and Taltson rivers: Camsell, 16

Winisk and upper Attawapiskat rivers regions: McInnis, 09a

*Economic geology.*

Copper: Tyrrell, 12

Coppermine River: Sandberg, 13

General: Tyrrell, 14b

Great Slave Lake: Cameron, 17

Hudson Bay region: Bell, 85d

Petroleum: Bell (R), 81a

*Historical geology.*

Anderson River region: Dawson (G M), 90b

Devonian, MacKenzie River Valley: Kindle, 16b

General: Camsell, 15; Isbister, 55; Richardson (J), 28

Great Bear Lake region: Bell (J M), 01, 01a

Great Slave Lake region, Mackenzie district: Bell (R), 00; Cameron, 17, 18

Hudson Bay region: Bell (R), 85 d

Mackenzie basin: Hebert, 75; Meek, 67; Petitot, 75

*Paleontology.*

Cretaceous and Tertiary floras: Dawson (J W), 83a

Devonian, MacKenzie River Valley: Kindle, 16b

MacKenzie River region: Meek, 67; plants, Mackenzie River: Dawson (J W), 90d; Heer, 80a

## Northwest Territories—Continued.

*Petrology.*

Coppermine River: Graton, 13c

Great Bear Lake region: Barlow, 01

*Physical geology.*

Sedimentation, Mackenzie River basin: Kindle, 18

*Physiographic geology.*

Glaciation: Tyrrell, 94

Mackenzie basin: Petitot, 75

Surface geology Chalmers, 05

Norwood, J. G., biography: Broadhead, 95a

Notharetus: Granger, 17; Gregory (W K), 13b, 15b, d

Nothodectes, dentition: Matthew (W D), 17c

## Novaculite.

Arkansas: Ashley, 97; Griswold, 92; Caddo Gap and De Queen quadrangles: Miser, 17

General: Turner (G M), 87

Oklahoma: Gould, 08d, 10c

Origin: Branner, 98b; Derby, 98; Rutley, 94

Tennessee: Ashley, 10b

## Nova Scotia.

Caledonia area, Queens Co.: Faribault, 15

Coal pebbles in fire clay, Westville: Poole, 89

Colchester and Halifax cos.: Faribault, 90

Cumberland Co.: Ells, 10d; Fletcher, 09

Explorations in 1907: Fletcher, 08

General: Emmons (E), 36; Fletcher, 91; Honeyman, 85b; Smith (T), 36

Halifax Co.: Faribault, 89, 91

Lahave Valley and Starrs Point: Wright (W J), 12

Lunenburg Co.: Faribault, 08, 10a

Pictou and Colchester cos.: Fletcher, 90

Progress of geological investigation: Ells, 03e

Sable Island: MacDonald (S O), 83

Southwestern N. S.: Bailey (L W), 94

Wolfville: Ami, 99h

*Economic geology.*

Antimony, West Gore, Hants Co.: Askwith, 01; Haley, 09

Arisaig-Antigonish district: Williams (M Y), 14  
Barytes, Ainslie and North Cheticamp: Poole, 07

Cape Breton Island: Harrison, 13

Five Islands: Hutchinson, 07a; Warren (C H), 11

Bedded leads in relation to mining policy: Woodman, 06

Bituminous shales: Ells, 09

Building and ornamental stones: Parks (W A), 12

Building stone: Gilpin, 02; Parks (W A), 14

Cape Breton Island: Fletcher, 79; Gilpin, 89a; Hayes (A O), 18

Boisdale Hills anticline: Boright, 04

northern: Fletcher, 85

Clay and shale deposits: Keele, 10a; Ries, 10, 11c

Clay, Lunenburg Co.: Faribault, 14b

Clyburn Valley, Cape Breton Island: Wright (W J), 14b

Coal: Brown (J F K), 17; Budden, 84; Credner, 66a; Denis, 12; Fletcher, 06a, 08; Gesner, 36; Gilpin, 84a, 91a, 96b, 97, 99, 05; Gray, 13, 17; Haliburton, 67; Lawson, 13b; Logan, 42; Rutherford, 70



## Nova Scotia—Continued.

*Economic geology*—Continued.

- Coal: Albion mines: Dawson (J W), 54a  
 Cape Breton Island, Sydney field: Brown (R), 50, 71; Dawson (J W), 70c; Fletcher, 94, 96, 97, 00a; Gilpin, 75, 86d, 95; Hudson (J G S), 13; Moseley, 98; Robb, 73, 74, 76; Routledge, 75, 86; Rutherford, 70a; Anon, 13  
 Cumberland field: Fletcher, 01, 04a; Gilpin, 82a; Hind, 73; McOuat, 74  
 DeBert field, Colchester Co.: Gilpin, 85a  
 eastern N. S.: Fletcher, 81  
 formation: Dawson (J W), 66  
 Gloucester Co.: Hayes (A O), 17  
 Joggins region: Hendry, 65  
 Pictou field: Coll, 08; Dawson (J W), 67d; Gilpin, 73, 73a, 76, 83a, 88; Haliburton, 67a, 70; Hartley, 70, 70a; How, 60; Logan, 70; Poole, 54, 60, 86, 93, 04; Rutherford, 10  
 South Joggins: Dawson (J W), 54  
 Springhill field, Cumberland Co.: Barlow (S), 74, 77; Fletcher, 99; Hartley, 70b; How, 76  
 structure: Dawson (J W), 60g  
 Copper: Dawson (J W), 50; Ells, 04c; Gilpin (E), 77b  
 Cape Breton Island, South Cheticamp: Grandin, 08  
 Copper Lake Mine, Antigonish: McLeod, 10  
 New Annan: Louis, 97  
 Cumberland and Colchester cos.: Ells, 85a  
 Cumberland Co.: Fletcher, 01  
 Domes: Rickard, 12  
 Eastern N. S.: Faribault, 87; Fletcher, 81, 87  
 Economic minerals: Gilpin, 03  
 Galena, Smithfield: Hardman, 96  
 General: Brown (R), 29; Credner, 66a; Fletcher, 03; Gesner, 36, 49; Gilpin, 98a, 00, 01; Honeyman, 65; How, 64, 67; Jackson, 55c  
 Gold: Anderson (W J), 64; Bailey (L W), 92; Becker, 95; Brown (E P), 13; Campbell (J), 63, 64; Credner, 66a; Creelman, 63; Dawson (J W), 61f; Faribault, 87, 92, 93, 96, 99, 99a, 00, 00a, 02, 03, 03a, 04, 05, 06, 13; Gilpin, 82b, 84, 86b, 89, 99a, 00a; Hamilton, 66; Heatherington, 68; Hind, 69a, 70, 70b, c, e; Honeyman, 62; Hunt, 68; Jackson, 62a; Knight (O W), 11; Lawson, 13b; Lincoln, 11a; Malcolm, 12; Marsh, 61; Monckton, 91; Perley, 65; Poole, 80; Prest, 95; Rickard, 12; Selwyn, 72a; Silliman (jr), 64, 64d; Stuart, 00; Woodman, 99b, 06  
 Cape Breton: Woodman, 99  
 eastern N. S.: Campbell (J), 62  
 Gay's River: Honeyman, 67  
 Gold River district: Willis, 98  
 Greenfield and Liverpool areas: Faribault, 14  
 Guysborough Co., Richardson mine: Brown (E P), 09  
 Halifax and Colchester cos.: Honeyman, 88c  
 Kings and Lunenburg cos.: Faribault, 09  
 Leipsigate district: Moore (P H), 09  
 Lunenburg Co.: Faribault, 09, 10a, 11, 14d; Lahave basin: Faribault, 11  
 Medway River basin: Faribault, 12

## Nova Scotia—Continued.

*Economic geology*—Continued.

- Gold: Montague mines: Honeyman, 72a  
 Moose River district, Halifax Co.: Woodman, 05  
 Mount Uniacke, Oldham, and Renfrew districts: Hind, 72  
 Oldham district: Faribault, 13, 14a  
 pre-Carboniferous age: Hartt, 64  
 Queens and Shelburne cos.: Faribault, 17  
 Queens Co.: Faribault, 14c  
 Tangier district: Howe (J), 61; Packard (G A), 07a  
 Waverley district: Halifax Co.: Gossip, 65; Hind, 69; Sinclair, 65; Wilson (B C), 94  
 West Gore: Haley, 09  
 Graphite: Ells, 04a  
 Greenfield and Liverpool areas: Faribault, 14  
 Gypsum: Credner, 66a; Dawson (J W), 47, 48; Gilpin, 81; How, 64; Jennison, 11; Cape Breton Island: Dawson (J W), 49a; Tyssowski, 09  
 Halifax and Colchester cos.: Honeyman, 88c  
 Infusorial earth deposits, Queens Co.: Faribault, 16  
 Iron: Dawson (J W), 50, 74b; Gilpin, 77a, 91b, 93a, 99; Harrington, 80; Hedley, 65; How, 64; Ingall, 98; Woodman, 07, 07a, 09, 13a, 14  
 Annapolis Co.: Fletcher, 05; Torbrook: Fréchette, 11, 12; Leckie, 93; Parsons (W F C), 06  
 Cape Breton: Lindeman, 14b  
 Cobequid Mountains: Hind, 73  
 Colchester Co.: Harrington, 73; Selwyn, 73a  
 East River, Pictou Co.: Honeyman, 70  
 limonite, Pictou Co.: Gilpin, 79  
 Londonderry: Hayes (A O), 17; Honeyman, 67a; Jackson, 55c  
 magnetite, Cobequid Mountains: Honeyman, 81a  
 Moose River: Honeyman, 80  
 Nictaux: Gilpin, 96a; Honeyman, 78; Weatherbe, 02  
 Pictou Co.: Dawson (J W), 80d; Gilpin, 77, 86a; Hartley, 70a; Hayes (A O), 17; Honeyman, 80b  
 Iron-stone, Halifax: Vickery, 15  
 Kings and Lunenburg cos.: Faribault, 09  
 Limestone: How, 64; Woodman, 16; Pictou Co.: Gilpin, 79, 87  
 Lunenburg Co.: Faribault, 08, 09  
 New Ross: Wright (W J), 14  
 Pleasant River Barrens: Faribault, 14d  
 Magnesite, Inverness Co.: Hayes (A O), 17  
 Manganese: Brumell, 92a; Gilpin, 85b; How, 64; Jennison, 98  
 Guysboro Co.: Gilpin, 94  
 Hants Co.: Jennison, 04  
 Loch Lomond, Cape Breton: Gilpin, 85  
 New Ross: Kramm, 12b  
 Marble: How, 64  
 Marl: Ells, 02a  
 Metalliferous sands: Honeyman, 82a  
 Mineral deposits, St. Mary Bay: Wilson (A W G), 13



## Nova Scotia—Continued.

*Economic geology*—Continued.

Mineral resources: Drummond, 18; Gilpin, 80, 82, 86, 96, 98; Heatherington, 74; How, 69; Piers, 07; Poole, 98; Anon, 03

Mineralized zone: Poole, 96

Minerals, economic, geologic relations: Gilpin, 90

Moose River schist veins: Hayward, 10

Northern N. S.: Fletcher, 04, 05

Oil fields: Ells, 08d

Oil shales: Ells, 09a, 10, 10a, b, c; Cape Breton: Gilpin, 99; Spence (H C E), 18

Pictou and Colchester cos.: Fletcher, 89, 92

Port Mouton area, Queens Co.: Faribault, 14c

Potters' clay, Middle Musquodoboit: Mason, 01

Queens and Shelburne cos.: Faribault, 16

Schist: Hills (V G), 12b; McCallum, 08a, 12

Sherbrooke gold district: Hind, 70

Shale: Keele, 10a; Ries, 10, 11c

South Cheticamp, Cape Breton Island, ore deposits: Grandin, 08

Southwestern N. S.: Bailey (L W), 95, 96, 98

Stirling zinc-copper-lead deposits, Cape Breton: Cairnes, 17b

Tin: Piers, 08, 12; New Ross: Faribault, 08; Young, 08

Tungsten: Camsell, 17b; Hills, 13; McCallum, 08a, 12

Cape Breton: Poole, 00; Ross, 99

Kings and Lunenburg cos.: Faribault, 09

Moose River: Faribault, 10, 10b; Hayward, 10

Western N. S.: Faribault, 18; Fletcher, 06a

Zinc: Gilpin, 94

*Historical geology*.

Albion Coal Measures: Dawson (J W), 54a

Albion mines, Pictou: Poole, 54

Annapolis and Kings cos.: Hayes (A O), 17  
Honeyman, 78

Annapolis Co.: Honeyman, 80

Antigonish Co.: Ami, 01m; Honeyman, 66  
76a, 86b

Arisaig area: Honeyman, 59, 64, 70b, 73; Twen-  
hofel, 13

Arisaig series: McLearn, 18a

Arisaig-Antigonish district: Williams (M Y),  
11, 12, 14

Auriferous beds: Prest, 95

Aylesford, Kings Co.: Honeyman, 88

Bay of Fundy region: Ells, 95c

Belleveau: Burwash, 77

Borings: Weatherbe, 04, 05; Cumberland Co.:  
Brown (R H), 07

Cambrian: Matthew (G F), 88b; Cape Breton  
Island: Matthew (G F), 00, 02a, 03, 14

Cape Breton Island: Brown (R), 45, 71; Daw-  
son (J W), 63a; Fletcher, 77, 79; Gilpin,  
86c; Honeyman, 90a; Lesley, 63; Robb,  
74, 76

Boisdale Hills anticline: Boright, 04

Cape Dauphin: Brown (R), 47

Clyburn Valley: Wright (W J), 14 b  
northern: Fletcher, 85

Ordovician: Gilpin, 92

Carboniferous: Ami, 00b, f, k; Dawson (J W).  
43, 45, 59, 66, 68a; Ells, 01d; Fletcher, 00b;  
Hyde, 15; MacKay, 00; Matthew (G F),  
01e; White (D), 01b, 02c

## Nova Scotia—Continued.

*Historical geology*—Continued.

Carboniferous: Cape Breton: Gilpin, 86d

conglomerate: Gilpin, 91

Cumberland Co.: Ami, 00c

folding: Gilpin, 83

Northumberland Co.: Fletcher, 08a

Riversdale: Ami, 99f

subdivisions: Hartt, 67

Chignecto Bay: Poole, 03b

Coal fields: Gilpin, 84a; Poole, 63; Cape Bre-  
ton: Dawson, (J W), 70c; Sydney field:  
Brown (R), 50

Coal Measures: Dawson (J W), 46; Lyell, 53a;  
South Joggins: Dawson (J W), 54

Cobequid Mountains, Archean gneisses: Honey-  
man, 81a

Cobequid region: Honeyman, 67a

Conglomerate capping Cambrian, age: Poole,  
03a

Cornwallis Island, Halifax Harbor: Honeyman,  
86c

Cumberland and Colchester cos: Ells, 85a

Cumberland and Hants cos.: Fletcher, 93

Cumberland coal field: Fletcher, 04a; Gilpin,  
82a; Woodman, 07a

Cumberland Co.: Fletcher, 00, 01; Lyell, 43c;  
Poole, 08a; McOuat, 74

DeBert coal field, Colchester Co.: Gilpin, 85a

Devonian: Ami, 00k; Ells, 01d; Matthew (G F),  
01e; Cape Breton: Gilpin, 90b

Dictyonema slates, Angus Brook: Ami, 03a;  
Poole, 03d; New Canaan and Kentville:  
Ami, 02b

Digby Co.: Honeyman, 81

Digby Neck: Bailey (L W), 96a

Eastern N. S.: Faribault, 87; Fletcher, 81, 87

Gaspereau Valley, geologic history: Haycock,  
02

Gay's River gold field: Honeyman, 67

General: Ami, 99a; Brown (R), 29; Dawson  
(J W), 52, 55, 57b, 60b, 68c, 79c; Ells, 03e;  
Fletcher, 92a, 95, 98, 00b, 02a, 03; Gesner,  
36, 43a, 49; Gilpin, 80; Hedley, 65; Honey-  
man, 65, 72, 73b, 74, 77, 78a, 79b; Jackson,  
28, 33; Lyell, 43d; Matthew (G F), 02e;  
Selwyn, 72a

Geologic map: Faribault, 06a

Geological cycles in the maritime provinces:  
Matthew (G F), 08a

George's River, Cape Breton: Honeyman, 73

Gneisses: Hind, 70

Gneissoid series: Hind, 70a

Gold districts: Hind, 70b, c; Gilpin, 82b, 89;  
Hind, 69a; Honeyman, 62; Hunt, 68;  
Malcolm, 12; Poole, 80

Gold-bearing rocks: Bailey (L W), 92; Faribault,  
92, 93, 94, 95, 96, 97, 98, 99, 99a, 00, 13;  
age: Gilpin, 86b

Gold-bearing series: Woodman, 99b, 04

Greenfield and Liverpool areas: Faribault, 14

Gypsiferous beds, position: Gesner, 49a

Halifax: Gossip, 64; Honeyman, 85f

Halifax and Colchester cos.: Honeyman, 83b,  
88c

Halifax Co., western: Hare, 81

Hall Harbor sheet: Can G S, 10



## Nova Scotia—Continued.

*Historical geology*—Continued.

- Horton-Windsor area: Bell (W A), 15  
 Joggins Carboniferous section: Bell (W A), 12, 13, 14; Logan, 45c  
 Kings and Hants cos.: Fletcher, 02  
 Kings Co.: Ami, 98; Haycock, 00, 02a; Honeyman, 79a  
 Kingsport sheet: Can G S, 11  
 Knoydart formation: Ami, 01f, g  
 Laurentian: Honeyman, 70a; Hunt, 70d  
 Laurentian and Huronian: Hind, 70d  
 Limestones: Woodman, 16  
 Louisburg, Cape Breton: Honeyman, 85c  
 Lower Carboniferous: Rogers (W B), 59d  
 Lunenburg Co., Pleasant River Barrens: Faribault, 14d  
 McNab's Island, Halifax Harbor: Honeyman, 86c  
 Medway River basin: Faribault, 12  
 Meguma series: Woodman, 04a, 08  
 Metamorphic and metalliferous rocks, eastern N. S.: Dawson (J W), 50  
 Metamorphic rocks: Honeyman, 73a  
 Moose River gold district, Halifax Co.: Woodman, 05  
 New Glasgow conglomerate: Fletcher, 02a  
 New Red sandstone: Dawson (J W), 48b  
 Nictaux region: MacKay, 96  
 Northern N. S.: Fletcher, 04, 05  
 Northwestern N. S.: Fletcher, 06  
 Paleozoic, upper, correlation: White (D), 01b  
 Permo-Carboniferous: Dawson (J W), 74a  
 Pictou: Dawson (J W), 55a; Gilpin, 87  
 Pictou and Colchester cos.: Fletcher, 89, 92  
 Pictou coal field: Hartley, 70; Honeyman, 72b; Logan, 70; Poole, 93, 04; southern synclinal: Gilpin, 76  
 Pictou Co.: Ami, 02; Honeyman, 72c, 80b; Hovey (H C), 82a; East River: Honeyman, 70  
 Pictou Island: MacKay, 91  
 Pictou region: Dawson (J W), 80d; Poole, 60  
 Plaister Cove, Cape Breton Island: Dawson (J W), 49a  
 Point Pleasant: Cameron, 81  
 Port Mouton area, Queens Co.: Faribault, 14c  
 Pre-Cambrian: Hind, 70e  
 Queens and Shelburne cos.: Faribault, 16  
 Red sandstones: Dawson (J W), 52; McKay, 66  
 Riversdale formation: Ami, 03c  
 Riversdale-Union and Windsor formations: Hyde, 14  
 Riversdale-Union group, Truro: Hyde, 13  
 Sable Island: MacDonald (S D), 82  
 St. John plant beds, age: Matthew (G F), 01g  
 Saratoga Springs: McGuier, 69  
 Shelburne Co.: Powers, 15a  
 Silurian, Antigonish Co.: Ami, 01b; eastern N. S.: Honeyman, 60  
 Silurian section at Arisaig: Twenhofel, 09  
 South Joggins: Dawson (J W), 82  
 Southwestern N. S.: Bailey (L W), 95, 96, 98, 98d  
 Springhill coal field, Cumberland Co.: Barlow (S), 74, 77; Fletcher, 99; geologic map: Fletcher, 03

## Nova Scotia—Continued.

*Historical geology*—Continued.

- Structure and succession at North Sydney and Sydney mines: DeWolfe, 06  
 Sydney coal field, Cape Breton: Brown (R), 45; Fletcher, 94, 96, 97, 00a; Gilpin, 95; Hyde, 15  
 Triassic; Powers, 15d, 16  
 Triassic (?), Digby basin: Bailey (L W), 98c  
 Triassic traps: Marsters, 90  
 Union and Riversdale formations: Ami, 02c  
 Union formation: Ami, 03c  
 Victoria, Cape Breton, and Richmond cos.: Fletcher, 78  
 Volcanic rocks: Matthew (W D), 95  
 Waverley gold district: Hind, 69  
 Western N. S.: Faribault, 18; Poole, 62  
 Windsor-Horton: Bell (W A), 13  
 Windsor-Pennsylvanian section, Strait of Canso: Hyde, 14a  
 Yarmouth Co.: Honeyman, 81

*Mineralogy.*

- Ankerite, Londonderry: Louis, 79a  
 Baddeckite, Victoria Co.: Hoffmann, 98a  
 "Barrel quartz": Silliman (jr), 64  
 Carboniferous, Cape Breton: Gilpin, 89a  
 Faroelite: How, 58  
 General: Alger, 27; Gesner, 36; Gilpin 93; How, 62, 66, 67, 77a; Jackson, 28, 33  
 Gmelinite: Howe, 76; Pirsson, 91a  
 Goethite: Goldschmidt, 10  
 Gyrolite in trap: How, 61a  
 Halotrichite, Cape Breton: Gilpin, 85c  
 Howlite, Windsor: Penfield, 87a  
 Lake Ramsey district: Piers, 12  
 Ledererite: Jackson, 33a; Marsh, 67c  
 Lievrite: Gilpin, 81a  
 Louisite, Blomidon: Louis, 78  
 Meteorites: Honeyman, 88g  
 Mineral localities: Marsh, 63  
 Mordenite: How, 64a  
 Natro-boro-calcite: How, 57, 61  
 Opal, Lunenburg Co.: Piers, 13  
 Pickeringite, Hants Co.: How, 63, 63c  
 Sundry minerals: Louis, 78  
 Trap minerals: Gilpin, 81b; Bay of Fundy: How, 59; localities: McCulloch, 92

*Paleontology.*

- Acrothya, Cape Breton: Matthew (G F), 01d  
 Air-breathers, coal period: Dawson (J W), 63, 94f  
 Amphibia, Joggins: Agassiz (L), 62a; Dawson (J W), 63, 94f; Marsh, 62, 62a; Owen (R), 62  
 Amphibian footprints, Carboniferous: Matthew (G F), 05  
 Annapolis Co.: Honeyman, 79  
 Arisaig, Silurian: Billings, 74; Honeyman, 59; McLearn, 18a  
 Articulata, Carboniferous: Scudder, 82c  
 Asaphus: Green (J), 34a; Moose River: Honeyman, 88d  
 Asthenodonta, South Joggins: Whiteaves, 94a  
 Baphetes planiceps, Pictou: Owen (R), 54  
 Bellinurus, Riverdale: Ami, 99f  
 Bellinurus grandaevus, Colchester Co.: Jones (T R), 09



## Nova Scotia—Continued.

*Paleontology*—Continued.

- Brachiopoda, Carboniferous: Davidson (T), 63  
 Calamites: Dawson (J W), 69; upright, Pictou: Dawson (J W), 51  
 Cambrian, Cape Breton: Matthew (G F), 87, 01c, 02a, d, 03, 14  
 Cape Breton: Honeyman, 79  
 Carboniferous: Ami, 00b; Dawson (J W), 59, 60a, 63, 70g, 83c  
 Amphibia: Dawson (J W), 76a; Matthew (G F), 03b  
 Cumberland Co.: Ami, 00c  
 Entomostraca: Jones (T R), 84  
 flora: Dawson (J W), 63f  
 footprints: Dawson (J W), 72c; Matthew (G F), 03d  
 from fossil tree trunks: Dawson (J W), 82  
 Insecta, Cape Breton: Scudder, 75c, 76c  
 Myriapoda: Scudder, 69, 73  
 Plantae, South Joggins: Dawson (J W), 54, 64b  
 Ostracoda: Dawson (J W), 97c  
 Pelecypoda: Dawson (J W), 94e  
 pulmonates: Dawson (J W), 76g  
 South Joggins: Dawson (J W), 62  
 Coal beds: Poole, 63  
 Coal Measures: Dawson (J W), 46; Lyell, 53a  
 Coal plants: Dawson (J W), 63g; Cape Breton: Bunbury, 47a  
 Cockroaches, Carboniferous, Cape Breton: Scudder, 74  
 Crustacea, Paleozoic: Dawson (J W), 77g; South Joggins: Salter, 63  
 Dendroperpeton, South Joggins: Dawson (J W), 63c, 91a  
 Dictyonema websteri: Ruedemann, 08a  
 Diploxyton, Carboniferous: Dawson (J W), 77a  
 Erect trees, South Joggins: Dawson (J W), 95a  
 Etchaminian fauna, Cape Breton: Matthew (G F), 99f  
 Fern, Carboniferous: Dawson (J W), 60e; Sydney coal field, Cape Breton Island: Bunbury, 52  
 Fish tooth, Arisaig series: Whiteaves, 98c  
 General: Ami, 99a; Dawson (J W), 55, 79c; Honeyman, 88b  
 Horton flora: White (D), 13a  
 Hylonomus, South Joggins: Dawson (J W), 91b  
 Hylopus: Matthew (G F), 04b  
 Insecta, Paleozoic: Dawson (J W), 67b; South Joggins: Dawson (J W), 92a  
 Occurrence of land animals at South Joggins: Dawson (J W), 92c  
 Land Mollusca, Coal Measures: Lyell, 53b  
 Lepidophloios: Dawson (J W), 97a  
 Mastodon remains: Piers, 12a  
 Myriapoda and Arachnida: Scudder, 95a  
 Naiadites, Carboniferous: Dawson (J W), 94d  
 Nautilus brookfieldi, Lower Carboniferous, Colchester Co.: Honeyman, 88a  
 Ostracoda, Arisaig: Jones (T R), 70  
 Cambrian, Cape Breton: Matthew (G F), 02c  
 Inverness Co., Cape Breton: Jones (T R), 89b  
 Palaeaster, Arisaig: Billings, 60c  
 Phillipsia, Carboniferous: Billings, 63e; Hants Co.: How, 63a

## Nova Scotia—Continued.

*Paleontology*—Continued.

- Pictou Co.: Honeyman, 80b  
 Psammodus, Cape Breton Island: Whiteaves, 81c  
 Reptilia, Coal Measures: Lyell, 53b; Wyman, 53a  
 Reptilian footprints: Selwyn, 72c; Cape Breton: Dawson (J W), 63e  
 Sigillaria, Cape Breton: Dawson (J W), 74d; upright, South Joggins: Dawson (J W), 61; Sydney coal field, Cape Breton: Brown (R), 49  
 Siliceous lake deposits: MacKay, 85  
 Silurian: Hall, 60i  
 Antigonish Co.: Ami, 95a  
 Arisaig: Twenhofel, 09; catalog: Ami, 92  
 eastern N. S.: Honeyman, 60  
 Mollusca: Billings, 74b  
 Silurian and Devonian plants: Matthew (G F), 07a  
 South Joggins: Dawson (J W), 60f  
 Spirorbis on Carboniferous plants: Honeyman, 88f  
 Sternbergia: Dawson (J W), 57d  
 Stigmara, Stellarton: Poole, 02a; Sydney coal field: Brown (R), 48  
 Sydney coal field flora: White (D), 13a  
 Torbrook district: Ami, 05c  
 Tracks, Knoydart formation, Antigonish Co.: Ami, 02a  
 Trees, erect, Sydney, Cape Breton Island: Brown (R), 46  
 Trees, fossil: Bunbury, 46b; Cumberland: Lyell, 43c  
 Triassic (?) fossils in boulder clay, Kings co.: Haycock, 02a  
 Trigonocarpum, Cape Breton Island: Dawson (J W), 61a  
 Whittleseya: White (D), 01c; Riversdale formation: Ami, 00j  
 Zonites, Carboniferous: Dawson (J W), 67  
*Petrology.*  
 Antigonish Co.: Honeyman, 86a  
 Arisaig-Antigonish district: Williams (M Y), 14  
 General: Honeyman, 85a  
 Granite contact zone, Halifax: McIntosh, 15  
 Shelburne Co.: Powers, 15a  
 Triassic basalt, Cape d'Or: Powers, 16a  
 Yarmouth gold-bearing series, crystalline rocks: Honeyman, 83  
*Physical geology.*  
 Carboniferous, folding: Gilpin, 83  
 Cave, Hants Co.: Prest, 12  
 Coast, changes of level: Gesner, 61a  
 Contorted strata, Gold River district: Willis, 98  
 Cumberland basin, submerged forest trees: Hamilton, 69  
 Deformation of unconsolidated beds: Kindle, 17b  
 Earthquake, Cape Breton: McIntosh, 13; of March 21, 1904: Woodman, 06a  
 Faults of Battery Point: Fulton (T T), 06  
 Ferruginous concretions, Grand Lake: Honeyman, 83c  
 General: Bailey (L W), 96b



## Nova Scotia—Continued.

*Physical geology*—Continued.

Ice action near Grand Lake, Cape Breton: Brodie, 12

Ice-borne sediments, Minas Basin: Bancroft (J A), 05

Lacustrine deposits: MacKay, 84, 85

Metamorphic rocks: Honeyman, 73a

Pictou coal fields, faults and folds: Gilpin, 88

Red beds, origin of color: Dawson (J W), 49

Shore development in Bras d'Or lakes: Woodman, 99a

Siliceous lake deposits: MacKay, 84, 85

South Joggins deposits, rate of accumulation: Rogers (W B), 59c

Submerged forest, Fort Lawrence: Dawson (J W), 55b

Subsidence, at Louisbourg: McIntosh, 06  
of the Atlantic coast: Poole, 06b  
southern coast: Prest, 92

Tidal erosion, Bay of Fundy: Matthew (G F), 80

Volcanic bombs from near Lake Ainslie: Poole, 08

*Physiographic geology.*

Antigonish Co.: Honeyman, 66

Arisaig-Antigonish district: Williams (M Y), 14

Cape Breton Island, forelands of Bras d'Or Lakes: Woodman, 13; physiographic divisions: Goldthwait, 17

Continental shelf off N. S.: Poole, 06c

Cow Bay beaches: McIntosh, 16

Drift deposits: Dawson (J W), 48a

General: Daly (R A), 01; Goldthwait, 13a, 15a; Murphy, 85

Glacial boulders: Honeyman, 89a

Glacial drift, distribution: Honeyman, 85e

Glacial transportation: Honeyman, 83a

Glaciation: Belt, 66; Goldthwait, 14d; Honeyman, 77, 82, 88e, k; Murphy, 85; Silliman (jr), 64a; Woodman, 99c

Cape Breton: Honeyman, 90

Halifax region: Honeyman, 76b, 86

Kings Co.: Coldwell, 96

Lunenburg, central: Prest, 96

southwestern N. S.: Bailey (L W), 91

King's Co.: Ami, 98

Moraines, Prince Edward Island: Bain (F), 85a

Shoreline, Cascumpeque Harbor, Prince Edward Island: Johnson (D W), 13b

Surface geology: Chalmers, 94, 95; Pictou coal field: Poole, 90

Windsor-Horton: Bell (W A), 13

*Underground water.*

Mineral waters: How, 63b

Nulato-Council region, Alaska: Smith (P S), 10a

Nullipores, Cincinnati: James (U P), 74a

Nummulites: Heilprin, 82c, 85b

Nunataks: Tarr (R S), 09

Nyctodactylus: Williston, 02d

Oahu: Dana (J D), 89a

Oak Hill area, Cal.: Carey, 07

Obolella chromatica, structure: Billings, 76

Observatory Inlet, B. C.: McConnell, 12

Obsidian, Yellowstone National Park: Iddings, 88

Ocala limestone, age: Cooke (C W), 15

Ocean, age: Becker, 10a; chemical evolution: Lane, 06d; origin: Fairchild, 04c; pre-Cambrian: Daly (R A), 12b

Ocean basins, origin: Chamberlin, 03a; Crosby, 84a

Oceanic deposits, composition: Harrison (J B), 95

Oceanic currents in successive geological periods: Shaler, 66a

Oceanic troughs: Dana (J D), 89b

Oceans and continents, origin: Love, 08

Occlusion of igneous rock within metamorphic schists: Julien, 04a

## Ocher.

Georgia: McCallie, 10, 10b, 12; Watson, 06;

Cartersville district: Couper, 00

Jamaica: Nicholas, 08c

Pennsylvania, eastern: Stoddard, 10

Quebec, Haliburton and Bancroft areas: Adams (F D), 10d

Virginia: Watson, 07e; Richmond district: Darton, 11

Odontornithes: Grinnell, 81; Marsh, 73b, 75c, 76e, 77a, 80

Oelrichs folio, S. Dak.-Nebr. (no. 85): Darton, 02a

Ogishke conglomerate, Minn.: Grant (U S), 92; Winchell (A), 90e

## Ohio.

Allen Co.: Winchell (N H), 74

Auglaize Co.: Winchell (N H), 74

Belmont Co.: Andrews (E B), 74; Atwater (C), 19

Bibliography: Prosser (M W), 06

Boulders, erratic, Cuyahoga Co.: Claasen, 98; in coal: Orton, 92; Perry Co.: Hicks, 79

Catalog of survey collections: Mather, 42

Chemical report: Lord, 84; Wormley, 71

Columbiana Co.: Newberry, 78a

Crawford Co.: Winchell (N H), 74

Defiance Co.: Winchell (N H), 74

Delaware Co.: Winchell (N H), 74

Fairfield Co.: Andrews (E B), 74

Findlay borings, temperature: Johnston (J), 13

General: Atwater (C), 26, 38; Emmons (S F), 93; Hildreth, 25, 29, 34, 36a; Newberry, 70;

Niles, 66; Riddell, 37

Geologic development: Carney, 11a

Geological Survey: Hildreth, 36

history: Newberry, 73; Orton, 90, 94; Prosser (C S), 06

publications, index to: Derby, 06

organization and work: Orton (jr), 03

reports: Mather, 38, 38a; Newberry, 71a, 72

Greene Co.: Orton, 74

Hancock Co.: Winchell (N H), 74

Hardin Co.: Winchell (N H), 74

Henry Co.: Winchell (N H), 74

Mercer Co.: Winchell (N H), 74

Monroe Co.: Andrews (E B), 74

Morrow Co.: Winchell (N H), 74

Ohio Geological Survey, first, personnel: Whittlesey, 85a

Ottawa Co.: Winchell (N H), 74

Paulding Co.: Winchell (N H), 74

Pickaway Co.: Andrews (E B), 74

Pike Co.: Orton, 74

Portage Co.: Newberry, 78a

Putnam Co.: Winchell (N H), 74

Ross Co.: Orton, 74



**Ohio—Continued.**

Soils: Klippart, 71  
 Stalagmite, fossiliferous, Cuyahoga Glen:  
   Claypole, 97b  
 Stark Co.: Newberry, 78a  
 Tuscarawas Co.: Newberry, 78a  
 Union Co.: Winchell (N H), 74  
 Van Wert Co.: Winchell (N H), 74  
 Wood Co.: Winchell (N H), 74

*Economic geology.*

Abrasive materials: Carney, 10b  
 Asphaltic coal, Huron River: Newberry, 75a  
 Athens Co.: Andrews (E B), 73; Briggs, 38a  
 Berea grit: Read, 83  
 Berea oil sand, Summerfield quadrangle,  
   structure: Condit, 16a  
 Berea sand, lithology: Panyity, 18  
 Berea sandstone: Burroughs, 13; Orton, 79  
 Building stone: Bownocker, 15; Carney, 10b;  
   Hawes, 84; Orton, 84c  
 Carroll Co.: Stevenson, 78  
 Cement materials: Carney, 10b; Eckel, 13;  
   Lord, 88  
 Clay: Carney, 10b; Orton, 84d; Orton (jr), 93;  
   Kenova quadrangle: Phalen, 08a  
 Clay and shale resources, Cleveland area: Van  
   Horn, 16  
 Coal: Ashley, 05d; Bownocker, 17; Burroughs,  
   13b; Burrows (J S), 15; Carney, 10b;  
   Haseltine, 02; Hildreth, 35; Newberry,  
   57, 71; Orton, 83b, 86a, 93b, c, 96a; Ray,  
   14; Rogers (H D), 43b; Roy, 84, 84c, 85,  
   90; Whittlesey, 72b, 76a, 77b  
   Allegheny field: Whittlesey, 54a  
   analyses: Newberry, 74y  
   Bedford cannel coal: Orton, 84e  
   Belmont Co.: Stevenson, 78  
   Carroll Co.: Stevenson, 78  
   Columbiana Co.: Newberry, 78a; Silliman  
     (jr), 59  
   Columbiana, Stark, and Tuscarawas cos.:  
     Whittlesey, 79a  
   constitution: Orton, 84h  
   Coshocton Co.: Hodge (J T), 78  
   Guernsey Co.: Stevenson, 78  
   Hanging Rock district: Orton, 78b  
   Harrison Co.: Stevenson, 78  
   Hocking Valley: Andrews (E B), 78; Bur-  
     roughs, 14b; Hunt, 74, 74i, 79a, 81; Orton,  
     89a; Read, 78b  
   Holmes Co.: Wright (A A), 84  
   Jackson Co.: Roy, 84a, 94, 99a  
   Jefferson Co.: Newberry, 78b  
   Kenova quadrangle: Phalen, 06b, 08a, 12  
   Licking Co.: Read, 78  
   Mahoning Co.: Newberry, 78b  
   Mahoning Valley: Roy, 76a  
   Massillon field: Newberry, 83b; Orton, 84i  
   Meigs Creek field: Brown (C N), 84  
   Monongahela coals: Bownocker, 08  
   Muskingum Co.: Stevenson, 78; Stout, 18  
   northeastern Ohio: Claypole, 95d; Newberry,  
     71b; Whittlesey, 84a  
   Perry Co.: Mather, 53; Whittlesey, 72a  
   Pittsburghseam: Brown (C N), 88; Burroughs,  
     14c  
 Pomeroy and Federal Creek field: Lovejoy, 88

**Ohio—Continued.***Economic geology—Continued.*

Coal: Pomeroy field: Bownocker, 08a  
   Portage Co.: Newberry, 78a; Whittlesey, 78  
   seam No. 6: Whittlesey, 75  
   southeastern Ohio: Andrews (E B), 71a, b,  
     73, 74  
   southern Ohio: Stout, 16  
   Stark Co.: Newberry, 78a  
   Straitsville seam: Whittlesey, 73  
   Tuscarawas Co.: Newberry, 78a  
   Washington Co.: Andrews (E B), 64  
   Western Reserve: Whittlesey, 53  
 Coal fields, boundaries (maps): Orton, 93d  
 Coal measures: Newberry, 74a  
   lower: Orton, 84  
   northeastern Ohio: Newberry, 71b  
 Coal seams, correlation: Orton, 84k; of lower  
   coal measures: Orton, 84a  
 Coal tonnage: Clark (F R), 17  
 Columbiana, Stark, and Tuscarawas Cos.:  
   Whittlesey, 79a  
 Columbus quadrangle: Hubbard (G D), 15;  
   Stauffer, 11a  
 Crawford Co.: Briggs, 38a  
 Cuyahoga Co.: Newberry, 73a  
 Erie Co.: Newberry, 74b  
 Fairfield Co.: Hyde, 12  
 Gallia Co.: Andrews (E B), 73  
 Geauga Co.: Read, 71  
 General: Atwater, 38; Hildreth, 38; Mather, 38,  
   38a; Newberry, 71; Orton, 90e; Whittle-  
   sey, 58, 59  
 Glass sand: Burchard, 07i; Toboso: Carney, 08c  
 Guernsey Co.: Andrews (E B), 74  
 Gypsum: Orton, 88e, l; Peppel, 04  
 Hanging Rock region: Lord, 84a  
 Highland Co.: Orton, 71a  
 Hocking Co.: Briggs, 38a  
 Hocking Valley: Hunt, 74, 81  
 Holmes Co.: Read, 71, 78a; Wright (A A), 84  
 Hydraulic cement: Bleininger, 04  
 Iron: Carney, 10b; Hildreth, 36; Orton, 84b, f;  
   Willis, 86a  
   Hanging Rock district: Cobb, 87; Lord, 84a;  
     Orton, 78b  
   Hocking Valley: Andrews (E B), 78; Hunt,  
     74, 79a, 81; Read, 78b  
   Kenova quadrangle: Phalen, 08a  
   southeastern Ohio: Andrews (E B), 71a  
   southern Ohio: Kent, 77  
   Tuscarawas Co.: Roy, 84b  
 Lime resources: Carney, 10b; Orton, 88f, 04  
 Limestone resources and lime industry: Orton  
   (jr), 06, 07  
 Limestones, microscopic structure: Grimsley, 93  
 Lorain Co.: Newberry, 74b  
 Map, oil and gas fields, Allen, Auglaize, and  
   Mercer cos.: Orton, 88j; Hancock and  
   Wood cos.: Orton, 88k  
 Meigs Co.: Andrews (E B), 73  
 Mineral products: Carney, 10b  
 Mineral resources: Bownocker, 11b  
 Montgomery Co.: Orton, 71  
 Morgan Co.: Andrews (E B), 73  
 Muskingum Co.: Andrews (E B), 73; Foster,  
   38; Stout, 18



## Ohio—Continued.

*Economic geology*—Continued.

Natural gas: Bownocker, 02, 03, 16; Carney, 10b; Newberry, 71k, 73d; Orton, 84g, 86, 86b, 87a, 88h, m, 90

Berea grit: Orton, 88c

Cadiz quadrangle: Condit, 14

central Ohio: Bownocker, 03a

Cleveland field, Cuyahoga Co.: Bownocker, 16a; Rogers (G S), 17b; Van Horn (F R), 15a, 17

Clinton gas pools: Panyity, 17

Corning field: Bownocker, 01

Findlay field: Orton, 86c, 88b

horizons: Orton, 84j

Knox Co.: Newberry, 70; Read, 78

northwestern Ohio: Orton, 85

Oberlin: Hubbard, 13

Ohio shale: Orton, 88d

origin of rock pressure: Orton, 90c, d

Pittsfield: Burroughs, 13a

Richland township, Vinton Co.: Panyity, 17

Steubenville quadrangle: Griswold, 07a

Trenton limestone: Orton, 87, 88b, 89

Trumbull Co.: Hough, 45

Woodsfield quadrangle: Condit, 16b

Wooster field, Wayne Co.: Bonine, 15

Noble Co.: Andrews (E B), 74

Northeastern Ohio: Newberry, 57; Whittlesey, 69a

Oil, black shales: Ashley, 17

Oil-producing rocks: Bownocker, 02

Peat deposits: Dachnowski, 12

Perry Co.: Whittlesey, 72a

Petroleum: Andrews (E B), 61; Bownocker, 03, 17a; Carney, 10b; Day (D T), 02; Fuller, 17; Newberry, 59; Orton, 86, 86b, 88h, m, 90; Rogers (H D), 60; Warner, 71

Berea grit: Orton, 88c

Berea oil sand, Flushing quadrangle: Griswold, 08

Bremen field: Bownocker, 10

Cadiz quadrangle: Condit, 14; Griswold, 02

Cleveland: Van Horn (F R), 17

Clinton oil: Bownocker, 11a

Corning field: Bownocker, 01

eastern Ohio: Griswold, 03

Flushing quadrangle: Griswold, 08

horizons: Orton, 84j

Knox Co.: Read, 78

Lima field: Orton, 86c, 88b

Macksburg field: Minshall, 88

Oberlin: Hubbard, 13

Ohio shale: Orton, 88d

Pittsfield: Burroughs, 13a

Summerfield quadrangle: Condit, 16a

Trenton limestone: Orton, 88b, 89

Woodsfield quadrangle: Condit, 16b

Wooster field, Wayne Co.: Bonine, 15

Salt deposits: Bownocker, 06; Carney, 10b; Hildreth, 33; northeastern Ohio: Bownocker, 05

Sand: Carney, 10b; Condit, 12

Sand-lime brick: Peppel, 05

Scioto and Hocking valleys: Briggs, 38

Southeastern Ohio: Andrews (E B), 71, 71a

Southern Ohio: Andrews (E B), 65; Stout, 16

## Ohio—Continued.

*Economic geology*—Continued.

Southwestern Ohio: Locke, 38

Summit Co.: Newberry, 73a

Tuscarawas Co.: Briggs, 38a

Washington Co.: Andrews (E B), 74

Wayne Co.: Read, 78a

Wood Co.: Briggs, 38a

*Historical geology*.

Adams Co.: Locke, 38; Orton, 71a

Alleghany coal field: Andrews (E B), 75a; Whittlesey, 54a, 74a

Allen Co.: Winchell (N H), 74

Arnheim formation: Foerste, 12b

Ashland Co.: Read, 78a

Ashtabula Co.: Read, 73

Athens Co.: Andrews (E B), 73; Briggs, 38a

Auglaize Co.: Winchell (N H), 74

Bedford and Berea ripples: Hyde, 11a

Bedford shale: Girty, 12b

Bedford-Berea unconformity: Burroughs, 11

Belfast bed: Foerste, 96

Belmont Co.: Andrews (E B), 74; Stevenson, 78

Berea formation: Verwiebe, 16

Berea grit: Orton, 82a, 88c

northeastern Ohio: Cushing, 88

unconformity at base: Cushing, 15

Berea sand, lithology: Panyity, 18

Berea sandstone: Orton, 79; in eroded Cleveland shale: Burroughs, 14

Black shales: Orton, 82

Borings, Cincinnati, Ivorydale: James (J F), 88b

Cleveland: Orton, 86d; Van Horn (F R), 17

Columbus: Mather, 59; Newberry, 61

northeastern Ohio: Bownocker, 05

Oxford: James (J F), 87a, b, 88f

Bradfordian rocks: Girty, 04e

Brown Co.: Herzer, 78

Butler Co.: Orton, 78

Carboniferous: Newberry, 74a; Appalachian basin: Stevenson, 04, 06

Carroll Co.: Stevenson, 78

Central Ohio: Prosser (C S), 10a, 12

Chagrin Falls section: Brainerd, 53

Champaign Co.: Hill (F C), 78

Chattanooga series: Ulrich, 12

Cincinnati region: Anthony, 47; Bassler, 06;

Clapp (A), 41; Fenneman, 16; Miller

(S A), 74a; Nickles, 02; Orton, 73; Perry

(N W), 89; Shideler, 16; Osborn: Wood-

ward (S F), 78

Cincinnati: Braun, 16

Cincinnati sedimentation: James (J F), 89

Clarke Co.: Orton, 73

Clermont Co.: Orton, 73

Cleveland: Pierce, 01

Cleveland gas field, Cuyahoga Co.: Rogers (G S), 17b

Cleveland shale, age: Cushing, 12; Delaware Co.: Hicks, 78

Clinton (Brassfield): Foerste, 85, 93, 96

Clinton Co.: Hussey, 78

Coal field: Orton, 83b; Whittlesey, 76a; northeastern Ohio: Whittlesey, 84a

Coal Measures: Lequereux, 52; Orton, 82c, 83a; Prosser, 01c; Stevens, 58a; Stevenson, 73;

White (I C), 91



## Ohio—Continued .

*Historical geology—Continued.*

- Coal Measures: lower: Orton, 84  
northeastern Ohio: Newberry, 71b  
Coalseam, northeastern Ohio: Claypole, 95d;  
No. 6: Whittlesey, 75  
Columbiana Co.: Newberry, 78a; Whittlesey, 80  
Columbiana, Stark, and Tuscarawas cos.: Whittlesey, 79a  
Columbus and Sandusky formations: Swartz, 07a  
Columbus limestone, thickness: Griggs, 04  
Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
Conemaugh formation: Condit, 09, 12a  
Corniferous: Bownocker, 98  
Coshocton Co.: Hodge (J T), 78; Orton, 84e  
Crawford Co.: Briggs, 38a; Winchell (N H), 74  
Cuyahoga Co.: Newberry, 73a  
Cuyahoga Falls: Hildreth, 36b  
Cuyahoga shale: Herrick, 91  
Cuyahoga Valley, drift deposits: Upham, 96a  
Darke Co.: Lindenmuth, 78  
Dayton region: Foerste, 15; Van Cleve, 49  
Deep wells: White (I C), 18  
Defiance Co.: Winchell (N H), 74  
Delaware Co.: Winchell (N H), 74  
Delaware limestone: Prosser, 05a  
Detroit River series, age: Stauffer, 16  
Devonian: Claypole, 03; Whitfield, 82b, 91; Stauffer, 07, 07a  
Devonian and Mississippian formations, northeastern Ohio: Prosser, 12a  
Delaware Co.: Winchell (N H), 74e  
middle: Stauffer, 09  
northern Ohio: Stauffer, 16b  
Ten Mile Creek: Stauffer, 08  
Devonian shales: Verwiebe, 17a; northern Ohio: Kindle, 12b  
Dunkard series: Stauffer, 16a  
Eastern Ohio: Orton, 80  
Erie Co.: Newberry, 74b  
Fairfield Co.: Andrews (E B), 74; Hyde, 12  
Fayette Co.: Hussey, 78  
Finger Lake bed, Ashland and Wayne cos.: Hubbard (G D), 14  
Findlay, deep borings: Condit, 13  
Flint Ridge: Mark, 16  
Flushing quadrangle: Griswold, 08  
Franklin Co.: Orton, 78a  
Fulton Co.: Gilbert, 71a, 73  
Gallia Co.: Andrews (E B), 73  
Geauga Co.: Read, 71, 73  
General: Andrews (E B), 79a; Bownocker, 03, 15; Carney, 11a; Hall, 43c; Hildreth, 28, 35, 36b, 38; Lapham, 37; Newberry, 68c, 70, 71, 71c, 73, 78; Orton, 71b, 88, 90, 90e, 93a, 99; Owen (D D), 46; Prosser (C S), 06; Riddell, 36, 37; Rogers (W B), 42a; Whittlesey, 38, 43, 49a, 58, 59, 69, 69a  
Geologic formations, nomenclature: Prosser, 05, 06  
Geologic map: Newberry, 70a, 79; Orton, 88i; Saylor, 65; Whittlesey, 56  
Greene Co.: Orton, 74  
Greenfield member, carbonaceous material: Napper, 16

## Ohio—Continued.

*Historical geology—Continued.*

- Guernsey Co.: Andrews (E B), 74; Stevenson, 78  
Hamilton Co.: Bell (T J), 82; Orton, 73  
Hamilton formation: Winchell (N H), 74d  
Hancock Co.: Winchell (N H), 74  
Hanging Rock district: Orton, 78b  
Hardin Co.: Winchell (N H), 74  
Harrison Co.: Stevenson, 78  
Henry Co.: Winchell (N H), 74  
Highland Co.: Orton, 71a  
Hillsboro sandstone, stratigraphic position: Prosser, 16b  
Hocking Co.: Briggs, 38a  
Hocking Valley: Andrews (E B), 78; Orton, 89a; Read, 78b  
Holmes Co.: Read, 71, 78a; Wright (A A), 84  
Huntington quadrangle: Campbell (M R), 00a  
Huron and Cleveland shales: Prosser, 13  
Huron Co.: Read, 78  
Jackson Co. coal field: Roy, 99a  
Jefferson Co.: Newberry, 78b  
Kenova quadrangle: Phalen, 12  
Knox Co.: Read, 78  
Lake Co.: Read, 73  
Licking Co.: Herrick, 87; Read, 78  
Mary Ann township: Carney, 09  
Perry township: Carney, 06  
Linton coal bed: Newberry, 74t  
Linton deposits, origin: Case, 17  
Logan Co.: Hill (F C), 78  
Logs in drift, Amboy: Wright (G F), 98c  
Lorain Co.: Newberry, 74b  
Lower Silurian horizons: Ulrich, 88a  
Lucas Co.: Gilbert, 71a, 73  
Madison Co.: Orton, 78  
Mahoning Co.: Newberry, 78b  
Mahoning Valley: Roy, 76a  
Marcellus shale, central Ohio: Whitfield, 80d  
Marion Co.: Winchell (N H), 73  
Maumee Valley, surface geology: Gilbert, 73  
Maxville limestone: Andrews (E B), 71c; Morse, 10; outliers: Lamb, 16  
Medina Co.: Wheat, 78  
Meigs Co.: Andrews (E B), 73  
Meigs Creek coal field: Brown (C N), 84  
Mercer Co.: Winchell (N H), 74  
Mercer limestone, Newark-Zanesville region: Mark, 11  
Miami Co.: Hussey, 78  
Mississippian: Andrews (E B), 71c; Verwiebe, 17; unconformities and conglomerates: Lamb, 11, 14  
Monroe Co.: Andrews (E B), 74  
Montgomery Co.: Orton, 71  
Morgan Co.: Andrews (E B), 73  
Morrow Co.: Winchell (N H), 74  
Muskingum Co.: Andrews (E B), 73; Foster, 38; Stevenson, 78; Stout, 18  
Niagaran formations, western Ohio: Prosser, 16  
Noble Co.: Andrews (E B), 74  
Nomenclature of formations: Prosser, 03  
Northeastern Ohio: Lesley, 75a; Whittlesey, 51b, 69a  
Northwestern Ohio: Orton, 85  
Oberlin quadrangle, glacial lake shore lines: Carney, 16a



## Ohio—Continued.

*Historical geology—Continued.*

- Ohio shales and their faunas: Branson, 11a  
 Olentangy shale, central Ohio: Grabau, 15a, 17c; northern Ohio: Stauffer, 15a  
 Ordovician, classification: Foerste, 05b  
 Ordovician-Silurian boundary: Shideler, 16  
 Ottawa Co.: Winchell (N H), 74  
 Paulding Co.: Winchell (N H), 74  
 Peat bed beneath drift, southwestern Ohio: Orton, 70  
 Pennsylvanian, southern Ohio: Hyde, 11  
 Pennsylvanian limestones, northeastern Ohio: Lamb, 10  
 Pickaway Co.: Andrews (E B), 74  
 Pike Co.: Orton, 74  
 Point Pleasant beds: James (J F), 92  
 Pomeroy coal: Bownocker, 08a  
 Portage Co.: Newberry, 78a  
 Preble Co.: Orton, 78  
 Putnam Co.: Winchell (N H), 74  
 Richland Co.: Read, 78  
 Richmond group: Nickles, 03  
   near Oxford: Shideler, 07  
   upper: Shideler, 14  
   Winchester: Foerste, 17  
 Ross Co.: Orton, 74  
 Rushville group, Perry Co.: Andrews (E B), 79  
 Salina group: Newberry, 73f; northeastern Ohio: Claypole, 95e  
 Sandusky Co.: Winchell (N H), 73  
 Scioto and Hocking valleys: Briggs, 38  
 Seneca Co.: Winchell (N H), 73  
 Shelby Co.: Hussey, 78  
 Silurian: Foerste, 17a  
 Silurian strata, nomenclature and subdivision: Lane, 09d  
 Somerset, Perry Co., coal deposition: Hyde, 12a  
 Southeastern Ohio: Andrews, 71a, b, 74; Case, 17  
 Southern Ohio: Andrews (E B), 65; Stout, 16  
 Southwestern Ohio: Fuller, 12b; Locke, 38; Orton, 73a  
 Stark Co.: Newberry, 78a  
 Steubenville quadrangle: Griswold, 07a  
 Stream channels at base of Pennsylvanian, southeastern Ohio: Schroyer, 15  
 Summerfield quadrangle: Condit, 16a  
 Summit Co.: Newberry, 73a  
 Sunbury shale: Prosser, 02  
 Sylvania sand, Cuyahoga Co.: Neff, 90  
 Todd's Fork: Foerste, 88a  
 Trenton limestone: Orton, 87, 88n  
 Trumbull Co.: Read, 73  
 Tuscarawas Co.: Briggs, 38a; Newberry, 78a; Roy, 84b  
 Unconformity at base of Onondaga: Kindle, 13b  
 Union Co.: Winchell (N H), 74  
 Van Wert Co.: Winchell (N H), 74  
 Warren Co.: Orton, 78  
 Washington Co.: Andrews (E B), 74  
 Waverly formation: Hyde, 15a; Morse (W C), 12; Orton, 79a; Prosser, 01, 04b  
 Waverly group: Cooper (W F), 90; Herrick, 89, 93; Hicks, 78a; northeastern Ohio: Girty, 01

## Ohio—Continued.

*Historical geology—Continued.*

- Waverly well: Bassler, 11a  
 Wayne Co.: Read, 78a  
 Western Reserve: Whittlesey, 53  
 West Sister Island: Gilbert, 73  
 Williams Co.: Gilbert, 71a, 73  
 Winchester, Richmond group: Foerste, 17  
 Wood Co.: Briggs, 38a; Winchell (N H), 74  
 Woodsfield quadrangle: Condit, 16b  
 Wooster area, Wayne Co.: Bonine, 15  
 Wyandot Co.: Winchell (N H), 73

*Mineralogy.*

- Calcite crystals, Kelleys Island: Ford (W E), 09a; Whitlock, 10b  
 Celestite, Put in Bay region: Kraus, 05; Wright (G F), 98e  
 Copiapite in coal: McCaughey (W J), 18  
 Meteorite, Cincinnati: Cohen, 98  
   Guernsey Co.: Smith (J L), 61  
   New Concord: Andrews (E B), 60a; Shepard, 60  
   Wayne Co.: Smith (J L), 64a  
 Strontianite, Moss Island: Troost, 22a; Put in Bay: Bigsby, 22

*Paleontology.*

- Actinophorus: Claypole, 95c  
 Agelacrinites and Streptaster, Richmond group: Williams (S R), 18  
 Agelacrinites rectiradiatus, Richmond group: Shideler, 18  
 Algae, Devonian: Lesquereux, 90  
 Amorphozoa: Nicholson, 75b  
 Amphibia, Coal Measures: Cope, 75e, m, 85g; Wyman, 57b, 58; Linton: Cope, 71p, 77h  
 Annelida, jaws, Cincinnati: Grinnell, 77; tubicolar, Cincinnati: Nicholson, 73c  
 Anthozoa, Silurian and Devonian: Nicholson, 75a  
 Anthracopupa, Coal Measures, Marietta: Whitfield, 81c  
 Arthrodira: Hussakof, 11; Cleveland shale: Dean, 01  
 Asaphus, Xenia: Green (J), 39  
 Asaphus with locomotory appendages, Cincinnati: Mickleborough, 83; Woodward (H), 84  
 Bison: Leidy, 52k  
 Bryozoa, Cincinnati and Silurian: Nicholson, 75k; Ordovician: Nicholson, 75a, c  
 Camarophorella from Waverly of Scioto: Hyde, 08a  
 Carboniferous: Foster (J W), 51i; Meek, 71f; Whitfield, 82b  
   invertebrates: Meek, 71e; Stevens (R P), 58  
   plants: Newberry, 56a, b, 74w  
   reptiles: Cope, 72o  
   tree, Monroe Co.: Herzer, 93  
 Castoroides, Nashport: Newberry, 74r  
 Castoroides ohioensis: Langdon, 83  
 Cephalopoda, Carboniferous: Miller (S A), 92a  
 Ceratocephala, Cincinnati: Anthony, 38; Springfield: Warder, 38  
 Ceraurus crosotus, Cincinnati: Locke, 43b, c  
 Chagrin Falls fossils: Brainerd, 52



## Ohio—Continued.

*Paleontology*—Continued.

- Cincinnatian: Anthony, 47; Faber, 86; Foerste, 09c; Hall, 60e, 61, 66, 72b; James (U P), 74a, b, 78, 83, 84, 84a; James (J F), 85d, 86c, 91; Meek, 71b, 72d, e, f; Miller (S A), 74, 75d, 78, 78a, b, 79c, 80e, 81b, g, 82a, d, e, 84, 92b, 94c, e; Ulrich, 78a, 79; Wetherby, 81a
- Agelacrinus holbrooki: James (U P), 87
- annelids: Ulrich, 78
- Brachiopoda: James (U P), 74, 74c; Miller (S A), 75
- Bryozoa: Ulrich, 79a, 82, 90e; Homotrypa bassleri: Nickles, 02a
- catalog: Harper, 96; James (U P), 71, 75
- Cephalopoda: James (J F), 86; Miller (S A), 75a
- conodonts: James (U P), 84b
- Crinoidea: Miller (S A), 82b, 83; Ulrich, 82a; Wetherby, 80
- Glyptocrinus baeri: James (U P), 85
- roots and stems: Dyche, 92b
- Crustacea: Miller (S A), 74b
- fucoids: James (J F), 84, 85c
- Gastropoda: Miller (S A), 74d
- land plants: Lesquereux, 74d, 78d
- list: Mickleborough, 78
- Monticuliporoidea: James (U P), 87a
- Paleaster: Miller (S A), 80d
- Pelecypoda: Miller (S A), 74c, e, 81a; Whitfield, 78a
- Protozoa: James (J F), 87
- trails: Miller (S A), 80
- Cincinnatian and Lexington fossils: Foerste, 09d, 10
- Cincinnatian and Mohawkian fossils: Foerste, 12a
- Cincinnatian types: Foerste, 16b
- Cladodont sharks, Cleveland shale: Claypole, 93d, 95b, g
- Cladodus: Claypole, 94a
- Cladodus clarki: Claypole, 95
- Cladoselache, Waverly: Dean, 94a
- Clinton (Brassfield): Foerste, 85, 89a, 93; Meek, 72e
- Coal Measures: Stevens, 58a
- Amphibia: Moodie, 16
- Linton, Vertebrata: Cope, 73zk
- Plantae: Kimball, 57; Perry Co.: Andrews (E B), 75b; Zanesville: Granger, 21
- Coccosteus: Claypole, 93b
- Cockroach fauna, Richmond: Scudder, 88
- Coelacanthus, Linton: Newberry, 74m
- Columnopora, Cincinnati: Nicholson, 74i
- Conemaugh fauna: Mark, 12
- Corniferous: Bownocker, 98
- Crinoid, Cincinnati: Anthony, 39
- Crinoidea: Meek, 65g
- Devonian: Hall, 75b
- Waverly, Summit Co.: Hall, 64
- Waverly group: Hall, 75c
- Cryptolithus tessellatus, Cincinnati: Locke, 42
- Ctenacanthus, Ohio: Claypole, 97d
- Ctenodus, Coal Measures: Cope, 74k
- Cyrtolites, Warren Co.: James (U P), 72
- Cystoidea: Foerste, 14b
- Cystiphyllum, Devonian: Nicholson, 75f

## Ohio—Continued.

*Paleontology*—Continued.

- Dalmanites, Cuyahoga shale: Claypole, 84f; Mississippian: Claypole, 84i
- Dayton region: Van Cleve, 49
- Devonian: Herzer, 02a; Meek, 71f; Whitfield 82b
- Crustacea: Whitfield, 80b
- invertebrates: Meek, 71e
- northern Ohio: Stauffer, 16b
- Pelecypoda: Hall, 73a
- Pisces: Claypole, 93a; Dean, 99a; Newberry, 57b
- plants: Newberry, 89d
- Dicotyles, Columbus: Klippart, 75; Newberry, 74p
- Dictyophyton, Waverly: Hall, 63h
- Dinichthyids, northern Ohio: Branson, 09a
- Dinichthys: Claypole, 92d, 93f, 96c, 97; Dean, 96a; Hussakoff, 05a
- Huron shale: Newberry, 85f
- structure: Wright (A A), 97
- ventral armor: Wright (A A), 93, 94
- Dinichthys and Cladodus: Clark (W), 98
- Dinichthys intermedius, Huron shale: Branson; 08a
- Dinichthys terrelli, Lorain Co.: Newberry, 74v, with restoration: Branson, 08b
- Drift vegetation: Newberry, 74x
- Echinodermata, Cincinnati: Meek, 72c
- Elephant, Zanesville, Ohio: Jeffries, 57a
- Elephas: Mather, 38d
- Enoploura, Cincinnati: Wetherby, 79
- Eurythorax, lungfish operculum: Hussakof, 16
- Flint Ridge, Bryozoa: Foerste, 87
- Fossil trees: Hildreth, 27
- Fungus, Coal Measures: Herzer, 93a
- Fusulina: Verneuil, 46
- General: Hildreth, 36b
- Getalodus, tooth: Safford, 53a
- Glacial man: Wright (G F), 93k
- Glyptodendron, Clinton rocks: Claypole, 78; Foerste, 93c
- Helicopora: Claypole, 82a, 83
- Hillsboro sandstone: Prosser, 16b
- Ichthyocanthus platypus, Coal Measures, Ohio: Moodie, 15e
- Insecta, Tallmadge: Scudder, 68c
- Invertebrata: Meek, 65j, 66d
- Carboniferous: Meek, 75c
- Ordovician: Hall, 75a
- Silurian: Hall, 75a; and Devonian: Meek, 73b
- Isotelus maximus, Cincinnati: Locke, 41
- Isotelus megistos, Cincinnati: Locke, 42a
- Land and fresh-water Mollusca, Defiance Co.: Sterki, 07
- Land plants, so-called, Ordovician: Newberry, 74f
- Licking Co.: Herrick, 87
- Limestones, microscopic structure: Grimsley, 93
- Linton coal bed: Newberry, 74t
- Linton fauna, environment: Case, 17
- Lungfish remains, Coal Measures: Hussakof, 16
- Mammalia of drift deposits, horizon: Newberry, 74j
- Mammoth's tooth: McClure, 04



## Ohio—Continued.

*Paleontology*—Continued.

- Mastodon:** Klippart, 75a  
**Auglaize Co.:** Gilbert, 71c  
**Bucyrus:** Foster, 39  
**Cincinnati:** Hayes (S), 95  
**Crawford Co.:** Horner, 43  
**Granville:** Hicks, 73  
**Maxwell limestone fauna:** Morse, 11  
**Megalonyx, Holmes Co.:** Claypole, 91a  
**Megalonyx jeffersoni:** Orton, 91a  
**Mercer limestone fauna:** Mark, 11  
**Microscopic shells, Cincinnati:** Hall, 45c  
**Monticuliporidae, Cincinnati:** Nicholson, 74g, 76, 80  
**Mylostoma:** Dean, 01a; Huron shale: Newberry, 83d  
**Nematophyton ortonii:** Penhallow, 96b  
**Niagaran:** Miller (S A), 82e  
**Ohio shale fossils:** Claypole, 88d  
**Ohio shales and their faunas:** Branson, 11a  
**Orthis insculpta, Oxford:** Christy, 58  
**Ostracoda:** Jones (T R), 90; Ulrich, 90f  
**Palasterina(?) jamesii:** Dana (J D), 63b  
**Paleaster, Cincinnati:** Locke, 46  
**Paleozoic Invertebrata:** Meek, 66c; Miller (S A), 93; Whitfield, 91  
**Pelecypoda, Ordovician:** Ulrich, 93  
**Placoderm, Cleveland shale:** Claypole, 92c, 94b  
**Placoderms, Devonian:** Claypole: 93e, 95h; Newberry, 85j; ancestry: Claypole, 96b  
**Plantae:** Hildreth, 36b; Newberry, 73c  
**Carboniferous:** Herzer, 01; and Devonian: Herzer, 02  
**Coal Measures:** Andrews (E B), 75; Foster, 53  
**coal:** Newberry, 53a, b, c, d  
**Summit Co.:** Whittlesey, 49  
**Pisces:** Claypole, 93; Dean, 11a, b; Newberry, 73b, 75, 78d  
**Carboniferous:** Newberry, 56d  
**Cliff limestone:** Newberry, 53e, 56c  
**Coal Measures:** Foster, 51d; Linton: Cope, 74g  
**Cuyahoga Co.:** Brainerd, 53  
**Delaware:** Newberry, 68b  
**Devonian:** Newberry, 71g  
**Erie shale:** Newberry, 88k  
**Problematic organisms, Washington Co.:** Karpinski, 09a  
**Psaronius:** Herzer, 97  
**Reptilia and Pisces, Linton:** Newberry, 68a  
**Richmond near Oxford:** Shideler, 07; Williams (S R), 10  
**Saccamina eriana, Kelleys Island:** Dawson (J W), 81f  
**Silurian:** Foerste, 09, 17a; Meek, 71f  
**Sphenodictya, Marietta:** Herzer, 01a  
**Sphenophyllum:** Newberry, 91a  
**Spirifer, Kelley's Island:** Klippart, 74  
**Sporocarps, Columbus:** Dawson (J W), 88g; in Ohio shale: Orton, 89c  
**Starfish, Cincinnati:** Graham, 46; Richmond, Adams Co.: Williams (S R), 14  
**Stomatoporoidea, Cincinnati:** Nicholson, 75j  
**Titanichthys:** Claypole, 92e, 96a; Newberry, 87f  
**Trilobite, Cincinnati:** Anthony, 39a  
**Montgomery Co.:** Taylor (J S), 50  
**Springfield:** Green (J), 37

## Ohio—Continued.

*Paleontology*—Continued.

- Trimerella, Ohio:** Meek, 71a  
**Trochiliscus:** Karpinski, 09  
**Ursus procerus:** Miller (G S), 99  
**Vertebrata, Coal Measures, Linton:** Cope, 75h; Newberry, 57d; Paleozoic: Cope, 97  
**Waverly fauna:** Cooper (W F), 90; Herrick, 89, 91; list: Cooper (W F), 88  
**Bryozoa:** Ulrich, 88  
**Wood, fossil, Carboniferous:** Claypole, 87b

*Petrology.*

- Boulders containing huronite:** Wright (A A), 97a  
**Celestite-bearing rocks:** Kraus, 05  
**Oil-field rocks, southeastern Ohio:** Goldman, 17  
**Sands:** Condit, 12

*Physical geology.*

- Anticlines in Chagrin shales, Cleveland:** Van Horn (F R), 10a  
**Cave in Clinton formation:** James (J F), 90d  
**Caves, Put in Bay:** Kraus, 05a  
**Clinton conglomerates and wave marks:** Foerste, 95  
**Concretionary forms in Greenfield limestone:** Napper, 17  
**Deformation, northern Ohio:** Decker, 16  
**Desiccation conglomerates:** Hyde, 08  
**Erosion, Fayette Co.:** Napper, 14  
**Faulting in coal bed, Richmond:** Huston, 83  
**Geologic structure:** Newberry, 78  
**Glacial erosion on Kelleys Island:** Carney, 10  
**Hydration caves:** Kraus, 05b  
**Intraformational pebbles, Richmond group, Winchester:** Foerste, 17  
**Landslide accompanied by buckling:** Van Horn (F R), 09, 10  
**Landslides:** Hubbard (G D), 08b  
**Postglacial erosion and oxidation:** Wright (G F), 12a  
**Reames Cave, Champaign Co.:** Hills (T M), 16  
**Ripple marks in limestones:** Prosser, 16a  
**Sandusky Bay, formation of:** Moseley, 05  
**Structure:** Orton, 93a  
**Subsidence of west end of Lake Erie:** Moseley, 05a

*Physiographic geology.*

- Akron, preglacial river bed:** Claypole, 92g  
**Ashtabula quadrangle, glacial shore lines:** Carney, 16b  
**Athens region:** Stearns, 99  
**Beaches, Lake Erie:** Leverett, 95a  
**Bellevue quadrangle, preglacial lake shorelines:** Carney, 13  
**Boulders:** Lapham, 32; Tappan, 28; Warren Co.: Scoville, 78  
**Brilliant, gravel, age:** Chamberlin (T C), 96; Wright (G F), 96a  
**Camp Sherman area:** Campbell (M R), 18  
**Cincinnati region:** Drake, 25; Fenneman, 16; James (J F), 86b; Nickles, 02, 05a; former course of Ohio River: James (J F), 88a  
**Cincinnati ice dam:** James (J F), 93c; Leverett, 91a; White (I C), 84; Wright (G F), 84c, 94b  
**Clifton gorge, Greene Co.:** Wells, 04  
**Columbus esker:** Morse, 07



**Ohio—Continued.***Physiographic geology—Continued.*

- Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Craighton Lake (glacial): Leverett, 14b; tilted shore lines: Hubbard (G D), 14a  
 Cuyahoga preglacial gorge, Cleveland: Up- ham, 96b  
 Cuyahoga River, drainage changes: Claypole, 92h  
 Cuyahoga Valley, preglacial: Pierce, 97  
 Dayton: Foerste, 15  
 Diluvial striae: Stoddard, 59  
 Drainage, preglacial: Fowke, 00; Tight, 94  
   Cincinnati region: Fowke, 98, 00a  
   Fairfield Co.: Tight, 97a  
   Jonathan Creek basin: Davis (H J), 99  
   Knox, Licking, and Coshocton cos.: Clark (W B), 02  
   Lancaster: Hyde, 04  
   Licking Co.: Tight, 94a  
   Pike Co.: Tight, 95  
   Ross Co.: Fowke, 95  
   southern Ohio: Leverett, 97c; Tight, 97  
   southwestern Ohio: Fowke, 01; Miller (A M), 01; Tight, 01  
   Washington Co.: Tight, 00  
   Wayne Co.: Todd (J H), 00  
 Drainage changes: Coffey, 14  
   Cincinnati region: James (J F), 88a  
   Moot's Run area, Licking Co.: Nixon, 13  
   southeastern Ohio: Tight, 00b, 03  
   southwestern Ohio: Fenneman, 14a  
 Drainage features, upper Ohio region: Cham- berlin (T C), 94e  
 Drift deposits: Claypole, 82; Orton, 88g; Whit- tlesey, 48; Wright (G F), 84c  
   Cincinnati: Burke, 88  
   southwestern Ohio: Leverett, 93b  
 Drift phenomena, Portage Co.: Redfield, 44  
 Esker group south of Dayton: Scheffel, 08  
 Fairfield Co.: Hyde, 12  
 Finger lakes, ancient: Hubbard (G D), 08a  
 Forest, interglacial: Locke, 43a  
 Fossil wood, Pleistocene: Gazlay, 33  
 General: Leverett, 91; Newberry, 73; Tight, 00a; Whittlesey, 38, 69  
 Glacial boundary: Wright (G F), 83, 84, 84a  
 Glacial boulders: Wright (G F), 94a  
 Glacial dam at Hanover: Carney, 07d  
 Glacial epoch, chronology: Wright (G P), 08b  
 Glacial features, white clays: Leverett, 92a  
 Glacial striae, bearings: Whittlesey, 84  
 Glacial succession: Leverett, 93  
 Glaciation: Carney, 10c; Haas, 17; Newberry, 74; White (I C), 84; Wright (G F), 88, 90c  
   central Ohio: Leverett, 99d  
   early: Hubbard, 13a  
   Erie basin: Leverett, 02  
   Kelleys Island: Carney, 10; Whittlesey, 79  
   Licking Co.: Tight, 94b  
   Loveland region: Leverett, 92b  
   Maumee Valley: Gilbert, 71d  
   northwestern Ohio: Winchell (N H), 73c  
   Ohio basin: Leverett, 02  
 Gravel beds, age: Wright (G F), 88

**Ohio—Continued.***Physiographic geology—Continued.*

- Holmesville terrace and moraine: Cole (G G), 18  
 Huron Co.: Read, 78  
 Kenova quadrangle: Phalen, 12  
 Lake age: Claypole, 87  
 Lake Cuyahoga: Claypole, 88f  
 Lake Maumee: Carney, 11c; Taylor (F B), 11a  
 Lake ridges: Wright (G F), 90d  
 Licking Co.: Scheffel, 09; Mary Ann Township: Carney, 09  
 Licking Narrows at Black Hand: Mather, 09  
 Little Miami River, history: Bownocker, 00  
 Locust Grove esker: Thompson (J D), 14  
 Maumee Valley: Emery (R), —  
 Moraines and beaches: Leverett, 92  
 Muskingum Co.: Stout, 18  
 Oberlin quadrangle, glacial lakes: Carney, 10a, 16a  
 Pleistocene, Akron: Claypole, 92  
 Preglacial channels: Claypole, 91c; western Ohio: Bownocker, 99  
 Preglacial Miami and Kentucky rivers: Fenne- man, 12  
 Preglacial stream diversion near St. Louisville: Clark (H), 11  
 Raised beaches of Berea, Cleveland, and Euclid sheets: Carney, 09b  
 Relief features: Carney, 11b  
 Rocky River, preglacial course: Gould (D T), 97  
 Scioto Illinoian lobe in Licking Co: Carney, 06a  
 Shore lines of Vermilion quadrangle: Carney, 11  
 Spring Valley gorge, origin: Scheffel, 07  
 Stream diversion near Lakeville: Hubbard (G D), 08c  
 Submerged valleys, Sandusky Bay: Moseley, 02  
 Terminal moraine: Wright (G F), 83  
 Terraces, Lake Erie: Whittlesey, 50  
   near Columbus: Hubbard (G D), 08d  
   Ohio River: Wright (G F), 96d  
   southeastern Ohio: Hubbard (G D), 08  
   southern Ohio: Andrews (E B), 60  
 Valley near Harrisburg: Nichols (R H), 10  
 Vegetable remains in drift: Winchell (N H), 76b  
*Underground water.*  
 Artesian well, intermittent: Gilbert, 74d  
 General: Flynn, 04; Orton, 99; Leverett, 97, 05  
 Southwestern Ohio: Fuller, 12b  
 Ohio shale problem: Ulrich, 12  
 Ohio shales: Branson, 11a  
 Ohio Valley coal fields, original connection of east- ern and western: Shaler, 87a  
 Oil. *See* Petroleum.  
 Oil reserves, estimation: Washburne, 15  
 Oil shales  
   Canada: Ells, 09a, 10, 10a, b, c; Young (G A), 09  
   Colorado: Alderson, 18; Ziegler, 18c  
   Grand River: Thiele, 82  
   Green River field: Winchester, 17  
   Green River formation: Winchester, 16a  
   northwestern: Chase, 18; De Beque, 16  
   Hoskin, 18; Winchester, 16a



## Oil shale—Continued.

- General: Alderson, 18; Gilbert (C E), 18a; Mitchell, 18; Selwyn-Brown, 16  
 Montana, Beaverhead Co.: Bowen (C F), 18a  
 New Brunswick: Baskerville, 09; Ells, 08a, f, 09a, 10, 10a, b, c  
 Albert and Westmoreland cos.: Ells, 11a  
 Albert shale deposits: Ells, 03a; Kramm, 13; Wright (W J), 14a  
 Nova Scotia: Ells, 08f, 09a, 10, 10a, b, c; Pictou: Spence (H C E), 18  
 Regional alteration: White (D), 15c  
 United States: Winchester, 17, 17a  
 Utah: Adkinson, 18; Clayton, 79; Ziegler, 18c  
 northeastern: Winchester, 16a  
 Uinta Basin: Winchester, 18b  
 Wyoming, Green River basin: Winchester, 16a  
 Okanogan batholith: Daly, 06a  
 Okanogan Mountains, Wash.: Evans (H F), 08  
 Oklahoma.

- American Association of State Geologists, field trip in Oklahoma: Hotchkiss, 17a  
 Bibliography: Trout, 15  
 Boulder deposits in mid-Carboniferous: Taff, 09b  
 Copper region, southern Okla.: Furman, 81  
 Dikes in Panhandle: Waldo, 02  
 General: Hill (R T), 90d; Johnston, 45; Marcou, 55; Marcy, 50  
 Geological Survey, organization: Gould, 08; report: Gould, 00e, 10; Shannon, 12, 14; Van Vleet, 02  
 Gypsum hills: Gould, 01d  
 Limonite geodes, Muscogee: Nichols (H W), 06  
 Soil geology: Loughridge, 84c  
 Volcanic dust: Williston, 92b

*Economic geology.*

- Arbuckle Mountains: Reeds, 10  
 Asphalt: Eldridge, 01; Gould, 08e, 09; Taff, 04f  
 Choctaw Nation: Taff, 99a  
 Comanche: Crane, 03a  
 Asphalt, asphaltite, petroleum, and natural gas: Hutchison, 11  
 Asphaltic coals: Crane, 06  
 Atoka quadrangle: Taff, 02  
 Building stone: Gould, 00d; Schramm, 04  
 Arbuckle Mountains: Reeds, 10  
 northeastern Okla.: Siebenthal, 08a  
 Cement resources: Taff, 05a; Eckel, 13; Gould, 08d, 10c, 11b; northeastern Okla.: Siebenthal, 08a  
 Clay: Gould, 08d, 10c, 11b; Snider, 11  
 Coal: Crane, 03, 06; Drake, 97; Gould, 08b, d, 09a, 10c; Scholz, 05; Stevenson, 96; Taff, 02a, 04a, b, c, d, e, 05c; U S, D I, 10  
 Choctaw field: Chance, 90a; Taff, 00  
 Colgate quadrangle: Taff, 01  
 eastern Okla.: Bache, 03  
 McAlester field: Brown (G M), 13  
 McAlester-Lehigh field: Taff, 99  
 Colgate quadrangle: Taff, 01  
 Copper: Gould, 08d, 10c  
 in "red beds": Fath, 15; Tarr (W A), 10  
 native, Enid: Haworth, 00a  
 southern Okla.: Furman, 81  
 Foraker quadrangle: Heald, 16  
 General: Gould, 02; Padon, 51

## Oklahoma—Continued.

*Economic geology—Continued.*

- Gold: Gould, 10c  
 Glass sands: Buttram, 13  
 Grahamite: Taff, 09a  
 Granite: Gould, 08d, 10c, 11b; Taylor (C H), 15  
 Gypsum: Gould, 02a, 04, 07, 07b, 08d, 10c; Snider, 13a, d  
 Iron: Gould, 08d, 10c  
 Joplin deposits: Bain, 16; Siebenthal, 15  
 Lead: Gould, 08d, 10c; Snider, 11c, 12  
 Arbuckle Mountains: Becker (C M), 14c  
 Miami district: Chapman (T), 12; Perry (E S), 17a; Ruhl, 08b  
 northeastern Okla.: Siebenthal, 08a, 15; Snider, 12  
 Quapaw district: Crane, 07  
 Lime resources: Cullen, 17  
 Limestone: Cullen, 17; Eckel, 13; Gould, 01h, 08d, 10c, 11b; Snider, 11d  
 Manganese: Harder, 10  
 Marble: Gould, 10c  
 Metalliferous minerals: Gould, 11a  
 Miami lead-zinc district: Chapman (T), 12; Perry (E S), 17a; Ruhl, 08b  
 Mineral production, 1901-1911: Ohern, 12  
 Mineral resources: Gould, 08d, 10c; Shannon, 14, 16, 17  
 Muscogee quadrangle: Taff, 06  
 Northeastern Okla.: Siebenthal, 08a  
 Natural gas: Gould, 08a, d, 10a, c, 12, 15; Shannon, 15, 17; Snider, 13; Wegemann, 16; Wood (R H), 13  
 Cushing field: Beal, 17; Buttram, 14a  
 Duncan field, Stephens Co.: Wegemann, 15d  
 eastern Okla.: Gould, 13a  
 Fort Smith-Poteau gas field: Smith (C D), 14  
 Glenn field: Smith (C D), 14a  
 Lawton field: Wegemann, 15f  
 Loco field, Stephens and Jefferson cos.: Wegemann, 15c  
 northeastern Okla.: Siebenthal, 08a; Snider, 12, 15  
 Osage Reservation: Bowen (C F), 18c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18; White (D), 18  
 Ponca City field: Ohern, 12a  
 southern Okla.: Hutchison, 11  
 Northeastern Okla.: Snider, 15  
 Oil and gas, east-central Okla.: Snider, 14  
 Oil and gas development: Wood (R H), 13  
 Oil and gas possibilities, Billings area, Noble Co.: Fath, 16; Bristow quadrangle: Fath, 17  
 Oil fields, geological features: Hager, 15a  
 Oil sands, correlation: Aurin, 17a  
 Osage Reservation: Bowen (C F), 18c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18; Winchester, 18a  
 Pawhuska quadrangle: Heald, 18c  
 Petroleum: Adams (G I), 01a; Burton, 18a; Gardner (J H), 15a, 17; Gould, 07a, 08a, d, 10c, 12, 13, 15; Hager, 15a, 17a; Perry, 10; Shannon, 15, 17; Snider, 13; Wittich (L L), 11a; Wood (R H), 13  
 analyses: Day (D T), 09d



## Oklahoma—Continued.

*Economic geology—Continued.*

- Petroleum: anticlinal theory, evidence on:  
Hager, 17  
Cushing field: Beal, 17; Buttram, 14a; Conkling, 16; map: Okla G S, 14a  
eastern Okla.: Gould, 13a  
Glenn oil and gas pool: Smith (C D), 14a  
Heraldton oil field, Carter Co.: Powers, 17c; Wegemann, 15b  
in red beds: Gould, 13  
Lawton oil and gas field: Wegemann, 15f  
Madill pool: Taff, 09c  
Muscogee fields: Taff, 05d  
northeastern Okla.: Siebenthal, 08a  
Osage Reservation: Bowen (C F), 18b, c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18; White (D), 18; Winchester, 18a  
Ponca City oil and gas field: Ohern, 12a  
southern fields, age of oil: Matteson, 18a; Powers, 17b; Pratt (W E), 18  
southern Okla.: Hutchison, 11  
Quapaw district, lead and zinc: Crane, 07  
Road materials: Snider, 11a  
Rock asphalts: Snider, 13b, c  
Salt: Gould, 08d, 10c; Snider, 13a  
Sand: Gould, 08d, 10c; Arbuckle Mountains: Reeds, 10  
Sandstone: Gould, 08d, 10c, 11b  
Shale: Gould, 08d, 10c  
Silver: Gould, 10c  
Structural materials: Gould, 11b  
Tahlequah quadrangle: Taff, 05  
Tishomingo quadrangle: Taff, 03  
Tripoli deposits: Gould, 08c; Perry, 17; Plumb, 14  
Volcanic dust: Buttram, 14  
Wapanucka limestone: Wallis, 15  
Wichita Mountains: Bain, 04, 04a, b; Woodruff, 04  
Zinc: Gould, 08d, 10c; Snider, 11c, 12  
Arbuckle Mountains: Becker (C M), 14c  
Davis field: Snider, 11b  
Miami district: Chapman (T), 12; Perry (E S), 17a; Ruhl, 08a  
northeastern Okla.: Siebenthal, 08a, 15  
Quapaw district: Crane, 07

*Historical geology.*

- Antelope Hills, Day Co.: Sherwin, 03  
Anthracolithic rocks: Beede, 09a; Prosser (C S), 10  
Arbuckle Mountains: Reeds, 10; Taff, 01a, 04; Vaughan, 99a  
Atoka quadrangle: Taff, 02  
Billings area, Noble Co.: Fath, 16  
Borings: Aurin, 17a  
Boulder deposits in mid-Carboniferous marine shales: Taff, 09b  
Bristow quadrangle, Creek Co.: Fath, 17  
Caney shale: Girty, 09b  
Caney shales, boulder beds, Talihina: Woodworth, 12  
Choctaw coal field: Chance, 90a; Taff, 00  
Coal Measures: Chance, 90b  
Colgate quadrangle: Taff, 01  
Comanche series: Hill (R T), 95a; Vaughan, 97  
Cotton and Jefferson cos.: Wegemann, 15a

## Oklahoma—Continued.

*Historical geology—Continued.*

- Cushing oil and gas field: Beal, 17; Buttram, 14a  
East-central Okla.: Snider, 14  
Foraker quadrangle: Heald, 16  
Fort Scott-Boone interval: Berger, 18  
Fort Smith-Poteau gas field: Smith (C D), 14  
General: Blake (W P), 56a; Cope, 94b; Gould, 01b, 02, 02a, 05; Marcou, 54a, 56; Shannon, 15; Snider, 17; Stevenson, 96; Vaughan, 97b; Wallis, 15  
Geologic history: Gould, 11  
Geologic map, eastern Okla.: Okla G S, 14  
progress of: Gould, 10b  
Glass Mountains, Wood Co.: White (M), 01  
Glenn oil and gas pool: Smith (C D), 14a  
Grandfield district: Munn, 14  
Grant, Garfield, and Woods cos.: Adams (G I), 98c  
Heraldton oil field, Carter Co.: Powers, 17c; Wegemann, 15b  
Hunton formation: Reeds, 11  
Kansas section: Beede, 10  
Limestone, new: Condra, 06c  
McAlester quadrangle: Taff, 98  
McAlester-Lehigh coal field: Taff, 99  
McCann sandstone: Gould, 00c  
Marion and Wellington formations: Gould, 01f  
Marion stage formations: Beede, 09  
Miami district: Perry (E S), 17a  
Mississippian, northeastern Okla.: Snider, 14a  
Morrow group: Mather, 15  
Muscogee quadrangle: Taff, 06  
Neva limestone: Beede, 14  
Northeastern Okla.: Snider, 12, 15  
Oil sands, correlation: Aurin, 17a  
Oolites, Chimneyhill formation: Reeds, 14  
Ordovician beneath Heraldton oil field: Powers, 17d  
Osage Co.: Greene (F C), 18  
Osage Reservation: Bowen (C F), 18b, c, d; Clark (F R), 18; Emery, 18; Heald, 18, 18a, b; Hopkins (O B), 18; Lloyd, 18; Ross, 18; Winchester, 18, 18a  
Ouachita Mountains: Hill (R T), 91a; Taff, 01a; structural features: Taff, 00b  
Ozark region: Adams (G I), 01  
Pawhuska quadrangle: Heald, 18c  
Pennsylvanian rocks: Gould, 10d  
correlation: Bloesch, 17  
northeastern Okla.: Ohern, 10  
Pennsylvanian-Permian contact: Kirk, 04  
Ponca City oil and gas field: Ohern, 12a  
Post-Permian, north-central Okla.: Bloesch, 17a  
Pottsville formations: Mather, 17  
Red beds: Adams (G I), 03a; Aurin, 17; Gould, 01a; Ohern, 18  
age: Adams (G I), 01b; Beede, 01a  
origin: Beede, 12a  
Red River region: Hill (R T), 94  
Salt plains: Gould, 01g  
Southern Okla.: Powers, 17b; Stephenson, 18  
Tahlequah quadrangle: Taff, 05  
Tertiary: Berry, 18a  
Tishomingo quadrangle: Taff, 03  
Travertine deposits: Emig, 17



## Oklahoma—Continued.

*Historical geology*—Continued.

- Trinity formation: Hill (R T), 88a  
 Wapanucka limestone: Wallis, 15  
 Wichita Mountains: Bain, 00; Gould, 04a; Taff, 04; Vaughan, 99a

*Mineralogy*.

- Kaolinite, intumescent: Schaller, 16b

*Paleontology*.

- Caney shale fauna: Girty, 09b; fishes: Eastman, 13  
 Carboniferous: Beede, 16  
 Chester group: Snider, 15a  
 Comanchean invertebrates: Cragin, 94b  
 Dinobastis: Cope, 93h  
 Dinosaur, sauropod, in Trinity Cretaceous: Larkin, 10  
 Eryops, red beds: Williston, 99c  
 Footprints, Pawhuska, Pennsylvanian: Jillson, 17  
 Invertebrata, Red Beds: Beede, 02c  
 McAlester coal field: Girty, 99  
 Morrow group fauna: Mather, 15  
 Permian Amphibia: Case, 11a; **Vertebrata**: Case, 02  
 Permian red beds fauna: Beede, 07; Cope, 84j  
 Plants, McAlester coal field: White (D), 99a  
 Pleistocene fauna: Troxell, 17b  
 Pleistocene Mammalia: Cope, 95b  
 Tertiary plants: Berry, 18a  
 Trimerorhachis: Williston, 15  
 Wewoka fauna: Girty, 11b, 15  
 Wichita Mountains: Weller, 00e

*Petrology*.

- Ægirite and riebeckite rocks: Rogers (A F), 07b  
 Granite: Taylor (C H), 15

*Physical geology*.

- Atoka quadrangle: Taff, 02  
 McAlester-Lehigh coal field: Taff, 99  
 Osage Reservation, structure: Emery, 18  
 Sand-barite crystals: Nichols (H W), 06  
 Tishomingo quadrangle: Taff, 03  
 Travertine deposits, Arbuckle Mountains: Emig, 17, 18

*Physiographic geology*.

- Arbuckle Mountains: Reeds, 10; Taff, 04  
 Arkansas Valley: Adams (G I), 00  
 Atoka quadrangle: Taff, 02  
 Canadian River, changes: Taff, 99b  
 Colgate quadrangle: Taff, 01  
 General: Hager, 16a; Loughridge, 84c; Snider, 17; Wallis, 15  
 Northeastern Okla.: Snider, 15  
 Ouachita Mountains: Hill (R T), 91a  
 Salt plains: Gould, 01g  
 Tahlequah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Wichita Mountains: Gould, 04a; Taff, 04

*Underground water*.

- Artesian water: Gregory (J W), 90  
 Canadian River, North Fork, ground water near Oklahoma City: Schwennesen, 14a  
 General: Gould, 05; Hill (R T), 93  
 Ground water, Enid: Schwennesen, 14  
 Northeastern, Okla.: Siebenthal, 08a  
 Tertiary springs: Gould, 01c  
 Old Red Sandstone, fluvial origin: Barrell 16,

- Olean rock city: Clarke (J M), 10  
 Olenellus and other Mesonacidæ: Walcott, 10a  
 Olenellus fauna: Walcott, 89c  
 Oligocene. *See* Tertiary.  
 Oligoporus: Jackson (R T), 95  
 Olivet folio, S. Dak. (no. 96): Todd, 03  
 Olivine diabase, Davidson Co., N. C.: Pogue, 10a  
 Olympic Mountains, Sawtooth Range, Wash.: Arnold, 09  
 Olympic Peninsula, Wash.: Arnold, 06a; Reagan, 09  
 Omphalosaurus: Merriam, 11e  
 Onaman iron range, Ont.: Moore (E S), 09b  
 Oneida conglomerate: Hartnagel, 07  
 Oneonta formation, New York: Darton, 93a  
 Onondaga fauna of Allegheny region: Kindle, 12  
 Ontario.  
 Abitibi region: Johnston (J F E), 02; Kay, 04; McMillan, 05; Wilson (W J), 02  
 Albany River, headwaters: Wilson (A W G), 03; Wilson (W J), 05  
 Algoma and Thunder Bay districts: Wilson (W J), 09  
 Attawapiskat River: McInnes, 05  
 Bridgewater district: Collins (J H), 93  
 Bureau of Mines, report: Blue, 92, 93, 94, 95, 96, 97, 98, 99, 00; Gibson, 01, 07  
 Byng Inlet region: Bell (R), 93  
 Climate changes, recent: Coleman, 10  
 Cylinders in Potsdam sandstone: Kavanagh, 89  
 Durham Co., Coleman, 04  
 Eastern Ont.: Ells, 99  
 English River region: McInnes, 00  
 Florence Lake district: Collins (W H), 10  
 General: Baddely, 37; Bonnycastle, 29  
 Goulais River-Dalton: Charlton, 99  
 Gunflint district: Trueman, 11  
 Haliburton area: Adams (F D), 99  
 Hudson Bay region: Savage, 16d  
 Index to reports of Bureau of Mines: Nicolas, 09  
 James Bay region: Dowling, 02a, 04; O'Sullivan, 05; Wilson (W J), 03  
 Lake Abitibi area: Baker (M B), 09  
 Lake Huron region: Bell (R), 94, 95; Bigsby, 21, 24; Collins (W H), 15, 16  
 Lake Nipigon region: Dowling, 99; McInnes, 95, 03; Parks (W A), 03; Thunder Bay district: Wilson (A W G), 09a  
 Lake Nipigon-Clay Lake region: Collins (W H) 09a  
 Lake Nipigon to Lac Seul: Collins (W H), 06a  
 Lake Superior, northwest of: Lawson, 90  
 Lake Superior region: Bayfield, 29; Bell (R), 72a; Collins (W H), 09b; McInnes, 92; Smith (W H C), 92; between the Pic and Nipigon rivers: Collins (W H), 06  
 Lake Temagami to Spanish River: Wilson (W J), 06  
 Lake Timiskaming region: Bell (R), 89; Parks, 05  
 Larder Lake district: Brock, 07; Wilson (M E), 10  
 London area: Stansfield, 16  
 Manitou Islands, Lake Nipissing: Goodwillie, 93  
 Mattagami Valley exploration: Kerr, 06  
 Mattawa River region: Barlow, 94  
 Michipicoten district: Bell (R), 99



**Ontario—Continued.**

- Montreal River district: Barlow, 08a; Collins (W H), 09c, 10, 11  
 Moose River basin: Bell (J M), 04  
 Muskoka district: Walker (T L), 06  
 Nagagami River region: Wilson (W J), 04  
 National Transcontinental railway route: Collins (W H), 08a  
 Niagara Falls, interruption in flow: Spencer (J W), 10a  
 Niagara River, relationship to glacial period: Spencer (J W), 10b  
 Nipigon Basin: Wilson (A W G), 10  
 Nipigon Lake region: Bell (R), 70b; Parks, 02  
 Nipissing district: Barlow, 93, 95; Miller (W G), 02a  
 Nipissing-Algoma boundary: Parks, 99  
 Onaman iron range: Moore (E S), 09b  
 Ottawa district, map: Ami, 02e  
 Ottawa Field-Naturalist's Club, geological work: Ami, 06b  
 Patricia district: Miller (W G), 12; Tyrrell, 13; Anon, 12d  
 Peterborough, Prince Edward, and Simcoe sheets: Johnston (W A), 06a  
 Peterborough and Simcoe sheets: Johnston (W A), 08  
 Peterborough district: Johnston (W A), 06  
 Porcupine district: Brock, 10b; Hassan, 10; Hatch, 10; Hore, 10f, 13a  
 Rainy Lake region: McInnes, 91, 96, 98  
 Red Lake region: Dowling, 96  
 Renfrew Co.: Ells, 96a  
 Rideau lakes: Drummond, 95  
 Round Lake-Abitibi River: Bolton, 03  
 Severn River, headwaters: Camsell, 05  
 Simcoe sheet: Johnston (W A), 09, 10  
 Soils, Ottawa area: Johnston (W A), 17;  
     Rainy River district: Johnston (W A), 15  
 Sudbury region: Bell (R), 90, 91a, 92  
 Sutton, Barrie, and Ottawa areas: Johnston (W A), 16  
 Thunder Bay-Algoma boundary: Parsons (A L), 08  
 Timagami district: Barlow, 04a  
 Timiscaming area: Barlow, 96  
 Vermilion Lake district: Comstock, 87a  
 Western Ont.: Collins (W H), 08; Dowling, 94; McInnes, 93, 99a  
 Whiskey Lake area: Coleman, 13a  
 Winisk River, northern Ont.: McInnes, 04, 05

**Economic geology.**

- Algoma district: Tanton, 17  
 Animikie (Loon Lake) district: Van Hise, 11  
 Anthracite, Sudbury: Ellis, 97; Mickle, 97  
 Anthracitic carbon, Algoma East: Coleman, 97a  
 Anthraxolite, Sudbury district: Brown (L P), 04  
 Apatite: Bell (R), 85e; Falding, 86; Hunt, 84; Jackson, 68a; Shutt, 87; Rideau Lake: Broome, 71; Ottawa district: Dawkins, 84; Kinahan (G A), 85  
 Arnprior and Cobalt districts: Cole, 11  
 Arsenic: Wells, 02  
 Asbestos: Ells, 03  
 Bruce mines district, Algoma: Ingall, 03a, 04a; Logan, 49a

**Ontario—Continued.****Economic geology—Continued.**

- Building and ornamental stones: Parks, 10b  
 Building stone: Bell (A), 96  
 Cement: Gillespie, 05  
 Clay deposits: Baker (M B), 06, 07d, 09a, b, 13a; Keele, 15b; Ries, 12b  
 Cobalt: Corkill, 06; Hardman, 05; Hore, 08; Ingall, 06b; Macdonald (J A), 06; Miller (W G), 05b  
 Cobalt area: Miller (W G), 13, 13a; Tyrrell, 08a  
 Gowganda district: Colvocoresses, 10  
 Halleybury district: Miller (W G), 03b  
 Miller Lake and Everett mines: Barlow, 09c  
 Montreal River district: Barlow, 09b  
 northern Ont.: Hore, 08  
 Timiskaming: Stutzer, 08a  
 Cobalt district: Anderson (G), 09; Bell (R), 06a, b, 07; Bell (J M), 14; Cole (A A), 10; Colvocoresses, 13; Courtis, 06; Davis (H P), 10; Dulieux, 10b; Emmons (S F), 10d, 11; Frank, 06; George (H C), 06; Hallowell, 10; Hardinge, 07; Hardman, 07; Higgins (E), 09a; Hore, 10, 11c, d, e, 12d, 13b, d; Hotchkiss, 05a; Knight (C W), 11a, 12; Loring, 07; Macdonald (J A), 06; Mickle, 11; Miller (W G), 07b, 11a, 13, 13a, b; Parks (W A), 05, 07a; Rickard (T A), 07a; Stokes (R), 07a; Tyrrell, 07a, 08a, 12c; Van Hise, 07  
 Bonanza mines: Hutchinson, 07  
 City of Cobalt mine: Adams (F D), 10b  
 cobalt-nickel arsenides and silver: Campbell (W), 06a, b; Miller (W G), 04, 05b, 13a; Stutzer, 08a  
 genesis of ores: Hixon, 07; Hore, 08a  
 vein formation: Tyrrell, 07a  
 Craigmont, corundum: Haultain, 07  
 Copper: Corkill, 06; DeKalb, 06; Wilson (A W G), 11  
 Bruce mines district, Algoma: Ingall, 03a, 05; Knight (C W), 15; Locke, 47; Williams (H J C), 07  
 Eldorado mine: Burrows (A G), 07  
 in Animikie of Thunder Bay: Lawson, 90c  
 Lake Huron: Ives, 90  
 Lake Michigan: Spencer (J W), 76a  
 Massey mine: Coleman, 13b; Lincoln, 17  
 Michipicoten Island: Poole (H), 92  
 Montreal River district: Barlow, 09b  
 northwestern Ont.: Parsons (A L), 18a  
 Parry Sound district: Coleman, 99b, 00  
 Point Mamainse, Lake Superior: Blue, 94; Dawson (J W), 57; Lane, 12  
 Sudbury district: Barlow, 91, 04, 06b; Bell (R), 91, 91b; Browne (D H), 06; Coleman, 12; Collins (J H), 88; Hore, 12c; Roberts (H M), 18; Stewart (L), 08; Stokes (R), 07b  
 Thunder Bay region: Coleman, 00  
 Tip Top mine: Moore (E S), 11c  
 Whiskey Lake area: Coleman, 13a  
 Corundum: Baker (M B), 05; Barlow, 05, 15, Blue, 99a; Gibson, 99; Kerr, 05; Miller (W G), 99, 99a, b; Hastings Co.: Adams (F D), 98



## Ontario—Continued.

*Economic geology*—Continued.

Devonian, southwestern Ont.: Stauffer, 15  
 Eastern Ont.: Ells, 97, 04d; Thomas (K), 02  
 Echo Lake region, Algoma: Whitney, 55b  
 Feldspar: Morsack, 09  
 French River sheet: Bell (R), 98  
 General: Bell (R), 89b; Blue, 92, 93, 94, 95, 96, 97, 98, 99, 00; Bonnycastle, 29; Coleman, 93; Corkill, 10; Gibson, 01, 07; Ont R Com, 90; Rottermund, 56, 57; Willmott, 83  
 Gold: Bell (J M), 13; Blue, 94; Coleman, 95, 96a; Corkill, 06; Lett, 13; Tyrrell, 13a  
 Algoma: Crosby, 02a  
 Beatty-Munro area: Hopkins (P E), 15a  
 Benoit township: Burrows (A G), 17a  
 Big Duck Lake: Hopkins (P E), 15  
 Boston Creek area: Burrows (A G), 16, 16b  
 Cripple Creek area: Bruce, 12a  
 Deloro: Wells, 97  
 Dryden area, district of Kenora: Thomson, 17  
 eastern Ont.: Knight (C W), 05a; Miller (W G), 02  
 Gauthier township: Burrows (A G), 17b  
 Goodfish Lake area: Burrows (A G), 16a, b  
 Haliburton area: Adams (F D), 00a  
 Hastings district: Chapman (E J), 72a; Hunt, 67; Michel, 67; Vennor, 72a; Wallbridge, 69  
 Kirkland Lake district: Bateman, 17; Burrows (A G), 14; Hardinge, 14; Hore, 13e; Spearman, 13, 14  
 Kowkash area: Hopkins (P E), 15b, 16a, 17  
 Lake Abitibi area: Baker (M B), 09; Miller (W G), 07  
 Lake Nipigon-Clay Lake region: Collins (W H), 09a  
 Lake of the Woods: Coste, 85; Douglas, 95; McKellar, 99; Rickard, 97a  
 Lake of the Woods, Manitou, and Dryden: Parsons (A L), 11  
 Larder Lake district: Brock, 07; Wilson (M E), 10, 12  
 Long Lake mine: Baker (M B), 17  
 lower Seine River: Bow, 99  
 McArthur township: Hopkins, 12  
 Marmora: Rothwell, 81  
 Matachewan area: Burrows (A G), 18  
 Michipicoten district: Bell (R), 99; Clarke (C H), 03; Willmott, 98a  
 Nipigon Basin: Wilson (A W G), 10  
 northwestern Ont.: Dron, 02  
 Peterborough Co.: Chapman, 94  
 Porcupine district: Baelz, 11, 12; Burrows (A G), 11, 12, 13, 15; Brock, 10a; Carter (W E H), 10; Davis (H P), 11; Dobbs, 14; Dulieux, 13; Fleming, 11; Gray, 10a; Hassan, 10; Hatch, 10; Hay (A M), 10; Hore, 10d-h, 11a, b, 12a, f, 13a, f, h; Knight (C W), 11; Lindsley, 11; Loring, 11; McDonald (P B), 11; MacLean, 12; Meyer (R A), 11; Miller (W G), 10; Shaw (S F), 11; Simon, 10; Stansfield, 11; Tyrrell, 15d; Whitman, 15  
 pre-Cambrian: Tyrrell, 15b  
 Rainy Lake district: Coleman, 95; Taylor (W W), 94

## Ontario—Continued.

*Economic geology*—Continued.

Gold: Rainy River field: Fleming, 09; Hille, 95, 08a; Merritt, 97; Winchell (H V), 97  
 Rickard township: Hopkins (P E), 18b  
 Sturgeon Lake district: Moore (E S), 11a  
 Swastika area: Bruce, 12, 14; Burrows (A G), 14  
 Thunder Bay district: Hille, 08a; McInnes, 99; Moore (E J), 10a  
 Timiskaming district: Burrows (A G), 14  
 Vermilion River: Coleman, 01; Evans (J W), 99; Gracey, 98  
 western Ont.: Bain (J W), 99; Brent, 03; Coleman, 96, 96d, 97, 97b, 98; Collins (W H), 08; Hille, 97, 05; McKellar, 99  
 West Shiningtree district: Collins (W H), 12; Hodge (W R), 12; Stewart (R B), 12, 13a  
 Wabigoon Lake: Brinsmade, 10a  
 Whiskey Lake area: Coleman, 13a  
 Woman River area: Allen (R C), 09a  
 Gold quartz veins, Michipicoten district: Means, 14  
 Gowganda district: Collins (W H), 09, 13; Colvocoresses, 10; Iseman, 10; West, 09  
 Gowganda to Porcupine area: McMillan, 12  
 Graphite: Bateman, 05; Ells, 04a; Lamb, 08; Ottawa Co.: Vennor, 74  
 Grenville sheet: Ells, 01a  
 Haileybury district, Lake Timiskaming: Miller (W G), 03b  
 Haliburton area: Adams (F D), 98, 00a  
 Hastings Co.: Macfarlane, 66; Wallbridge, 69  
 Iron: Blue, 93; Collins (W H), 06; Corkill, 06; Dewey, 84; Hille, 07; Ives, 88; Lindeman, 07, 13a; Mackenzie, 08; Merritt, 92; Miller (W G), 01b; Robinson (A H A), 17; Thompson (P), 06; Willmott, 08  
 Animikie range: Silver, 06  
 bog ore, English River: Moore (E S), 09a; Thunder Bay district: Moore (E J), 10a  
 Black Sturgeon region: Coleman, 09a  
 Boston township: Miller (W G), 05a  
 central Ont.: Chapman, 86  
 eastern Ont.: Ingall, 96, 01a  
 Glendower, Frontenac Co.: Miller (W G), 95  
 Gunflint area: Parsons (A L), 16  
 Gunflint Lake district: Van Hise, 11  
 Haliburton area: Barlow, 97  
 Hastings Co.: Wallbridge, 69  
 hematite, Little Current, Georgian Bay: Mills (S D), 05; Wallbridge, Hastings Co.: Chapman, 86a  
 Hunter Island: Parsons (A L), 16  
 Hutton district: Coleman, 04a; Culbert, 04  
 in Huronian quartzite: Hoffman, 91  
 Lake Nipigon ranges: Bain (J W), 01; Coleman, 07, 08e; Moore (E S), 07; Wilson (A W G), 10  
 Lake Savant area: Moore (E S), 10  
 Lake Superior region: Brinsmade, 08g; Hille, 04; Willmott, 04; Winchell (A), 90c  
 Lanark Co.: King (S), 10  
 limonite deposition at Sturgeon Lake: Bowles, 11a  
 Loon Lake district: Smith (W N), 05  
 magnetic, eastern Ont.: Pope, 00; Victoria Co.: Merritt, 83



## Ontario—Continued.

*Economic geology—Continued.*

Iron: magnetite ores: Ledyard, 91; along Central Ontario Railway; Lindeman, 13a  
Haliburton Co.: Foye, 16a; Calabogie, Renfrew Co.: Lindeman, 14a

Mattagami basin: Baker (M B), 11, 11a

Michipicoten region: Bell (J M), 05; Coleman, 99c, 00, 00b, 01a, 02a, c, 06, 06b; Goetz, 12; Moore (E S), 06; Parsons (A L), 15; Seelye, 10; Willmott, 01; Helen mine: Coleman, 06b; Seelye, 10

Moose Mountain range: Bell (J J), 08; Coleman, 13f; Collins (W H), 14; Leach (N L), 08; Leith, 03b; Lindeman, 13b, 14

Nipigon ranges: Coleman, 08e, 09

Nipissing district: Miller (W G), 01

north of Round Lake: Moore (E S), 09

northern Ont.: Miller (W G), 03

northwestern Ont.: Coleman, 02; Parsons (A L), 18a

Onaman ranges: Moore (E S), 08, 09b

Rainy River district: Hille, 08a; Robinson (A H A), 17

southeastern Ont.: Miller (W G), 14

Thunder Bay district: Hille, 08a; McInnes, 99

titaniferous: Chapman, 85

Victoria Co.: Merritt, 82

western Ont.: Hille, 02, 07

Woman River area: Allen (R C), 09a

Iron pyrites, southeastern Ont.: Hopkins (P E), 16

James Bay region: Ells (S C), 12; Wilson (A W G), 06

Kamiskotia Lake area: Burrows, 15a

Kaolin, Lake Nipigon district: Romanet du Caillaud, 08

Kingston district: Baker (M B), 13, 16; Ells, 02

Kingston-Lake Simcoe region: Murray, 54

Lac Seul region, western Ont.: McInnes, 02

Lake Abitibi area: Baker (M B), 09; Hopkins (P E), 18a

Lake Huron, north shore: Collins, 16; Logan, 49a

Lake Nipigon-Clay Lake region: Collins (W H), 09a

Lake of the Woods region: Lawson, 85; Van Hise, 11

Lake Superior region: Bayfield, 29; Bell (R), 70a, 73a; Brinsmade, 08g; Countis, 77; Ingall, 88; Logan, 47a; Macfarlane, 56a; Nicholson, 73b, 75m; Smith (W H C), 92

Beaver mine: Brent, 88

north shore: McKellar, 74

Lake Wendigokan region: Moore (E S), 09c

Larder Lake district: Wilson (M E), 10, 12

Laurentian and Huronian north of Lake Huron: Bell (R), 92a

Lead: Corkill, 06; Uglow, 16, 16a; Vennor, 75  
Galletta: Newnam, 17

Hastings Co.: Lewis (J V), 06

Kingdon mine: Hardman, 17

Lignite, Mattagami basin: Baker (M B), 11

Limestones: Fréchette, 18; Miller (W G), 05

London area: Stansfield, 16

Longuelac to Jellicoe: Burrows (A G), 17

## Ontario—Continued.

*Economic geology—Continued.*

McArthur township: Hopkins, 12

Madoc area, Hastings Co.: Knight, 13a

Mamainse, Lake Superior: Dawson (J W), 57

Manitoulin Island: Bell (R), 66

Maple Mountain district: Ramsay, 09

Marl: Ells, 02a

Mattagami basin, iron and lignite: Baker (M B), 11

Mattagami Valley: Kerr, 06

Mercury, Cobalt ores: Clevenger, 15

Metallogenetic epochs, pre-Cambrian: Miller (W G), 15

Mica: Cirkel, 05; Corkill, 05a, 06, 07; De Schmid, 11, 13a; Ells, 04b; Merritt, 95

Kingston district: Baker (M B), 13

Ottawa district: Ells, 94c

Michipicoton district: Cue, 97; Willmott, 98

Michipicoten Island: Willmott, 07

Miller Lake and Everett mines: Barlow, 09c

Mineral resources: Carter (W E H), 05; Coleman, 96c; Gibson, 11; Merritt, 89; Miller (W G), 02b, 04a

Mines of Ontario: Corkill, 06

Molybdenite: Parsons (A L), 17

Molybdenum deposits: Walker (T L), 11, 11a

Montreal River district: Barlow, 08, 09b, c; Collins (W H), 09c, 10, 11; Tyrrell, 08b

Moose River basin: Bell (J M), 04; Borron, 90

Muskoka district: Parks, 01

Natural gas: Brumell, 92; Chalmers, 02a; Corkill, 05, 06; Coste, 06; Denis, 00; Knight (C W), 15a; Malcolm, 15

composition: Mickle, 14

Essex Co.: Coste, 00

Kent field: Knight (C W), 07; Mickle, 10

Port Colborne: Ashburner, 89a, 90; McRae, 89  
southwestern Ont.: Brumell, 93a

Nickel: Miller (W G), 98, 05b; R Ont Nickel Comm, 17; Simmersbach, 17

Alexo mine, Timiskaming district: Baker (M B), 17; Coleman, 10d; Uglow, 11, 11a

Antik-Okan nickeliferous pyrrhotite deposits: Hille, 06

Haileybury district: Miller (W G), 03b

northern range: Coleman, 04a

Sudbury: Barlow, 91, 04, 06c; Bell (R) 91; Boeke, 14; Browne, 06; Clarke (F W), 89b; Coleman, 03, 04d, 05, 07d, 08, 12, 15c, 16b; Corless, 17; Dickson, 02a, 03a, 04; Foullon, 92; Goodwin, 93; Gregory (J W), 08b; Hixon, 06b, c, 09a; Hore, 12c, 13g; Howe, 14; Roberts (H M), 18; Silver, 02; Stewart (L), 08; Stokes (R), 07b; Stutzer, 08; Thomas (K), 12b, 14; Thompson (P), 06a; Walker (T L), 97

Nickeliferous pyrrhotites, microstructure: Campbell (W), 07

Nipigon district: Coleman, 09

Nipissing district: Collins (W H), 10a; Hore, 11, 11c, d, e; Uglow, 11, 11a

Nipissing mine, Cobalt: George (H C), 06

Nipissing-Timiskaming area: Barlow, 99

Northern Ont.: Livermore, 16; Stewart (A K), 16; Whitman, 17

Northwestern Ont.: Parsons (A L), 18a



## Ontario—Continued.

*Economic geology*—Continued.

- Ogahalla to Collins, Northern Transcontinental Railway: Hopkins (P E), 18  
 Oil fields, development: Williams (M Y), 18a  
 Oil prospecting in southwestern Ont.: Williams (M Y), 18b  
 Onaman Range: Moore (E S), 09  
 Onaping sheet: Collins (W H), 14, 17  
 Ottawa district, mineral resources: Ells, 99b, 01  
 Ottawa River region: Logan, 47  
 Peat: Anrep, 11, 14  
 Pembroke sheet: Ells, 07b  
 Petroleum: Bell (R), 88; Brumell, 92; Chalmers, 02a; Corkill, 05, 06; Coste, 06; Denis, 00a; Hunt, 68b; Knight (C W), 15a; Malcolm, 15; Miller (W G), 17c; Robb, 62a; Tyrrell, 65; Winchell (A), 66b  
 Enniskillen: Fleming, 63  
 Kent Co.: Coste, 07, 07a; Knight (C W), 07  
 Petrolia field: Stansfield, 17  
 southwestern Ont.: Brumell, 93a  
 Tilbury and Romney fields: Coste, 07, 07a  
 Petroleum springs: Robb, 61  
 Phosphate: De Schmid, 12a, 13; Falding, 86  
 Kingston district: Baker (M B), 13  
 North Burgess: Broome, 72  
 Ottawa Co: Vennor, 74  
 Phosphate and feldspar deposits: De Schmid, 12a, 13  
 Pigeon Point district: Van Hise, 11  
 Point Mamainse: Lane, 12  
 Porcupine district: Dobbs, 14  
 Porcupine lode, Port Arthur: Kirkland, 89  
 Port Arthur region, Lake Superior: Courtis, 87; McInnes, 01  
 Pre-Cambrian, Lake Timiskaming: Miller (W G), 05c  
 Pyrites: Fraleck, 07  
 Radioactive minerals: Brunton, 15  
 Rainy Lake region: McInnes, 96, 97; Van Hise, 11  
 Rainy River district: Fleming, 09; Hille, 09  
 Road materials: Reinecke, 15b, 16, 16a, 17, 17a; Trenton-Napanee: Clark (K A), 17  
 Salt: Bowen (N L), 11a  
 Goderich area: Heinrich, 79; Hunt, 70, 77  
 western Ont.: Gibson, 73a  
 Sand and gravel: Ledoux, 18  
 Secondary enrichment in copper ores: DeKalb, 06  
 Seine River and Lake Shebandowan areas: McInnes, 99  
 Seskinaka: Spearman, 15  
 Shabendowan district: Nicholson, 73b  
 Silurian, southwestern Ont.: Williams (M Y), 15b  
 Silver: Cole (A A), 10; Corkill, 06; Hore, 08; Miller (W G), 05b  
 Cobalt district: Adams (F D), 10b; Bastin, 17a; Bell (J M), 14; Bell (R), 06a, b; Courtis, 06; Davis (H P), 10; Dulieux, 10b; Emmons (S F), 10d, 11; Frank, 06; Hallowell, 10; Hardinge, 07; Hardman, 07; Higgins (E), 09a; Hixon, 07; Hore, 08, 11, 11c, f, 12d, 13c, d; Hotchkiss, 05a; Hutchinson, 07; Loring, 07; Miller (W G), 07b, 11a, 13, 13a; Parks (W A), 07a; Reid (J A), 18; Rickard (T A), 07a; Stokes (R), 07a; Tyrrell, 07a, 08a, 12c; Van Hise, 07

## Ontario—Continued.

*Economic geology*—Continued.

- Silver: Florence Lake district: Collins (W H), 10  
 Gowganda and Miller lakes area: Burrows (A G), 09  
 Gowganda district: Collins (W H), 09, 13; Colvocoresses, 10; Hore, 10b; Iseman, 10; West, 09  
 Haileybury district: Miller (W G), 03b  
 Lake Superior deposits: Miller (W G), 13a  
 Maple Mountain district: Ramsay, 09  
 Miller Lake and Everett mines: Barlow, 09c  
 Montreal River district: Barlow, 08, 09, 09b; Collins (W H), 09c, 10, 11; Meeks, 07a  
 Nipissing: Hore, 10c  
 Port Arthur: Courtis, 87; Kamanistiquia belt: Wood (H R), 90  
 Silver Islet, Lake Superior: Blue, 97; Du-bois, 71; Lowe, 82; McDermott, 77; Macfarlane, 80a; Nicholson, 73b  
 South Lorraine area: Burrows (A G), 09a; Phillips (W B), 09; Tyrrell, 13c  
 Sudbury area: Coleman, 13, 13f  
 Temagami Reserve: Mattair, 07  
 Temiskaming: Stutzer, 08a  
 Thunder Bay district, Lake Superior: Bell (R), 87c; Bowen (N L), 11; Chapman (E J), 69; Ingall, 88; McKellar, 95  
 Woods Location, Lake Superior: Macfarlane, 69  
 Slate Islands, Lake Superior: Parsons (A L), 18  
 Southeastern Ont.: Miller (W G), 14; Murray, 52a; Vennor, 70, 72, 72a, 73, 76  
 Sudbury deposits, classification: Coleman, 13i  
 Sudbury district: Barlow, 02, 04; Bell (R), 91, 91a, b, 92a; Bush, 94; Coleman, 04a, 05c; Dickson, 04; Garnier, 91; Hixon, 05; Peters, 90; Tanton, 17  
 Sudbury minerals, quantitative measurement: Dresser, 17  
 Sudbury ore deposits, genesis: Bateman, 17; Coleman, 15c, 16b, 17a; Corless, 16; Dresser (M A), 17; Goodchild, 18; Roberts (H M), 18; St. Clair, 14; Tolman, 17a; Walker (T L), 15; Anon, 16a  
 Sudbury-Cobalt-Porcupine region: Miller (W G), 13, 13c  
 Superior and Huron lakes region: Rottermund, 56, 57  
 Talc, Madoc area: Knight (C W), 13a  
 Thessalon area, Lake Huron: Knight (C W), 15  
 Thunder Bay district: Bowen (N L), 11; Hille, 09; Ingall, 87, 88; McKellar, 96; Nicholson, 73b  
 Tin: Miller (W G), 11  
 Timiskaming district: Baker (M B), 17; Burrows (A G), 14; Miller (W G), 05b  
 Topaz, tin, and granites: Miller (W G), 11  
 Upper lakes region: Coleman, 99  
 Vermilion River placers: Coleman, 01  
 Victoria, Peterborough and Hastings cos.: Adams (F D), 94  
 Western Ont.: Bell (R), 86b; Coleman, 97, 98  
 Zinc: Corkill, 06; Uglow, 16, 16b  
*Historical geology.*  
 Abitibi region: Johnston (J F E), 02; Wilson (W J), 02



## Ontario—Continued.

*Historical geology—Continued.*

- Albany River country: Bell (R), 87  
 Algoma district: Tanton, 17  
 Anderdon beds: Nattress, 11  
 Animikie iron range: Silver, 06  
 Animikie rocks, Thunder Bay: Ingall, 92  
 Animikie (Loon Lake) district: Van Hise, 11  
 Archean classification: Coleman, 12b  
   Lake Superior region: Lawson, 87b, 90d, 91b  
   Rainy Lake: Lawson, 12a  
   west of Lake Superior: Smith (W H C), 93  
 Archean conglomerates, origin: Barlow, 99a  
 Archean-post-Archean contact: Willmott, 04a  
 Arkona: Stauffer, 16b  
 Attawapiskat region: Bell (R), 87; McInnes, 05  
 Basaltic formation, Lake Superior: Dutton, 47  
 Beatty-Munro area, Timiskaming area: Hopkins (P E), 15a  
 Belleville district: Chapman (E J), 60a  
 Big Duck Lake area: Hopkins (P E), 15  
 Black River limestone, Lake Nipissing: Winchell (N H), 96c  
 Borings: Brumell, 92; Knight (C W), 15a  
 Boston Creek gold area: Burrows (A G), 16, 16b  
 Bruce mines district, Algoma: Ingall, 03a, 04a  
   05  
 Canadian shield, Proterozoic: Coleman, 15  
 Carp, Saxicava sands: Ami, 94c  
 Cataract formation: Schuchert, 13f, 14a  
 Cataraqui [Kingston]: Bonnycastle, 30  
 Central Ont.: Wilson (A W G), 01  
 Chazy formation in Ottawa Valley: Raymond  
   (P E), 11a, d  
 Cobalt area: Miller (W G), 13, 13a  
 Cobalt series, Timiskaming region: Wilson (M E), 13  
 Collingwood region: Chapman (E J), 60c  
 Copper and iron regions: Coleman, 00  
 Copper-bearing rocks, Lake Superior: Spencer  
   (J W), 76a; age: Logan, 52c  
 Corniferous, Anderdon: Nattress, 02  
 Corundum area: Miller (W G), 99  
 Cripple Creek gold area: Bruce, 12a  
 Detroit River area: Nattress, 12  
 Detroit River series, age: Stauffer, 16  
 Devonian: Nicholson, 74; southwestern Ont.:  
   Stauffer, 11, 15; western Ont.: Ami, 99b  
 Dikes, Rainy Lake region: Lawson, 91  
 Duck Islands, Lake Huron: Ami, 99a  
 Eastern Ont.: Ells, 97, 99, 00b, 03d, 04d; Giroux,  
   97; Knight (C W), 05a; gold belt: Miller  
   (W G), 02  
 Echo Lake region, Algoma: Murray, 58; Whit-  
   ney, 55b  
 English River region: McInnes, 00  
 Eramosa beds, Niagara formation: Williams  
   (M Y), 15a  
 Espanola district: Quirke, 17  
 Essex and Kent cos.: Nattress, 07  
 French River: Murray, 58  
 French River sheet: Bell (R), 98  
 Galletta: Ami, 94b  
 Gauthier township: Burrows (A G), 17b  
 General: Ami, 03b; Baddeley, 37; Bayfield, 45;  
   Bell (R), 89b; Bigsby, 24b, 27, 29a; Chap-  
   man (E J), 64, 75; Collins (W H), 13c;  
   Cope, 80k; Logan, 45b, 54b, c, 61; Malcolm,  
   15; Murray, 45, 54a; Ont R Com, 90;  
   Rogers (W B), 42a; Rottermund, 56, 57;  
   Willcox, 83a

## Ontario—Continued.

*Historical geology—Continued.*

- Geologic map: Merritt, 88a  
 Georgian Bay region: Bell (R), 78  
 Georgian Bay-Ottawa River region: Murray, 57  
 Glamorgan township, Haliburton Co.: Foye,  
   16a  
 Glauconite unconformity, Devonian: Andr  e,  
   14  
 Gold districts: Tyrrell, 13a  
 Goodfish Lake gold area: Burrows (A G), 16a  
 Gowganda district: Collins (W H), 09, 13  
 Gowganda to Porcupine area: McMillan, 12  
 Grenville series: Adams (F D), 08b  
 Grenville sheet: Ells, 01a  
 Grenville-Hastings series: Adams (F D), 97  
 Grenville-Hastings unconformity: Miller (W  
   G), 07a, 08  
 Guelph: Nicholson, 75i  
 Guelph dolomite: Clarke (J M), 03f  
 Guelph formation: Williams (M Y), 16a  
 Gunflint Lake district: Van Hise, 11  
 Hagersville district: Stauffer, 13  
 Haliburton area: Adams (F D), 98, 99, 00a;  
   Barlow, 97  
 Haliburton-Bancroft area: Adams (F D), 02,  
   13b; intrusions: Foye, 16  
 Hamilton: Grant (C C), 92c, 93, 98, 99, 00a, 01;  
   Walker (A E), 96, 97  
 Hamilton formation, Thedford: Shimer, 02;  
   Williams (M Y), 13  
 Hamilton region: Spencer (J W), 75  
 Hastings Co.: Chapman (E J), 60e; Macfarlane,  
   66; Wallbridge, 69; Wilkins, 77  
 Hastings region: Hunt, 67  
 Hudson Bay region: Savage, 17a  
 Hunter Island iron deposits: Parsons (A L), 16  
 Hunters Island: Smith (W H C), 92a  
 Huron Co.: Gibson, 73  
 Huronian: Coleman, 00a, 02g; Winchell (A), 89d  
   Lake Huron: Pumpelly, 92  
   north of Lake Superior: Bell (J M), 06  
   Sudbury: Bonney, 88  
   Timiskaming region: Collins (W H), 14b  
 Huronian clastics, western Ont.: Coleman, 98b  
 Huronian ice age: Coleman, 07c  
 Huronian-Laurentian contact, Lake Huron:  
   Barlow, 90  
 Iron Spur district: Uglow, 13  
 James Bay region: Dowling, 04; Savage, 17a;  
   Wilson (W J), 03  
 Kamiskotia Lake area: Burrows (A G), 15a  
 Killarney granite: Collins (W H), 16a  
 Kingston area: Baker (M B), 16; Ordovician:  
   Kindle, 16  
 Kingston district: Baddeley, 30; Ells, 02; rock  
   contacts: Ells, 03d  
 Kingston-Lake Simcoe region: Murray, 54  
 Kirkland Lake and Swastika gold areas: Bur-  
   rows (A G), 14  
 Kowkash gold area: Hopkins (P E), 16a, 17  
 Laccolithic sills, northwest coast of Lake Su-  
   perior: Lawson, 93a  
 Lac Seul region, western Ont.: McInnes, 62  
 Lake Abitibi area: Hopkins (P E), 18a  
 Lake Huron, north shore: Collins, 16; Logan,  
   49a; Murray, 57c



## Ontario—Continued.

*Historical geology—Continued.*

- Lake Huron region: Bell (R), 94, 95; Bigsby, 21, 24; Murray, 49, 50, 59; eruptive rocks: Fairbanks, 90a
- Lake Huron-James Bay region: Bell (R), 77
- Lake Iroquois and predecessors, Toronto: Coleman, 99f
- Lake Nipigon region: Dowling, 99; McInnes, 95; Parks (W A), 03; Wilson (A W G), 02, 09
- Lake Nipigon-Clay Lake region: Collins (W H), 09a
- Lake Nipigon to Lake Abitibi: Burrows, 13a
- Lake Nipissing: Murray, 57a, b
- Lake of the Woods, region east of: Lawson, 87
- Lake of the Woods region: Bell (R), 83a; Bigsby, 52; Lawson, 85, 89; Parsons (A L), 11, 13, 13a; Van Hise, 11
- Lake Ontario, western end: Spencer (J W), 82
- Lake Simcoe area: Baddeley, 36; Johnston (W A), 12, 14
- Lake Superior, north shore: Selwyn, 85a
- Lake Superior region: Bell (R), 70a, 72, 72a, 73, 73a; Bigsby, 24a, 52a; Harvey (A) 89a; Hille, 04; Hunt, 83e; Ingall, 88; Lawson, 91a; Logan, 47a; 52c; Macfarlane, 66a; 67, 71; Nicholson, 73b; Selwyn, 83c, d; Whitney, 56b; Winchell (A), 88, 90c; Kaministiquia and Michipicoten rivers: Murray, 47a
- Lake Timiskaming region: Parks, 05; Paleozoic rocks: Hume, 17
- Lake Wendigokan region: Moore (E S), 09c
- Lake Winnipeg-Hudson Bay: Low, 87
- Larder Lake district: Wilson (M E), 12
- Laurentian, Hastings Co.: Vennor, 68
- Laurentian and Huronian Barlow, 93a; Lake Huron region: Barlow, 92; Bell (R), 92a
- Laurentian system: Adams (F D), 08a; Miller (W G), 11c
- Laurentian-Huronian contact, north of Lake Huron: Bell (R), 93a
- Longuelac to Jellicoe: Burrows (A G), 17
- Loon Lake district: Smith (W N), 05; pre-Cambrian: Parsons (A L), 13a
- Lower Huronian ice age: Coleman, 08c
- Lowville limestone, Lake Simcoe district: Johnston (W A), 13
- McArthur township: Hopkins, 12
- Madoc area, Hastings Co.: Knight (C W), 13a
- Maganatawan River: Murray, 57a
- Malachi to Lake Nipigon: Collins (W H), 13b
- Mamainse, Lake Superior: Dawson (J W), 57
- Manitou Islands, Lake Nipissing: Goodwillie, 93
- Manitoulin Island: Bell (R), 66, 70; Foerste, 13; Ives, 90
- Manitoulin Island district: Ami, 03b; Ordovician section: Foerste, 12c
- Matachewan gold area: Burrows (A G), 18
- Medina formation: Schuchert, 14a
- Michipicoten, iron ranges: Bell (J M), 05; Coleman, 02a, c; Parsons (A L), 15
- Michipicoten Bay: Tight, 87
- Michipicoten district: Bell (R), 99; Coleman, 99c, 00b; Willmott, 98, 01

## Ontario—Continued.

*Historical geology—Continued.*

- Michipicoten Island: Burwash, 05; Poole (H), 92
- Mississaga River, Algoma: Graton, 03
- Mohawkian, Manitoulin Island and northeast: Foerste, 13
- Montreal River district: Collins (W H), 09c, 11
- Montreal River-Lake Huron region: Bell (R), 89a
- Moose Mountain iron range: Leith, 03b
- Moose River region: Bell (J M), 04; Bell (R), 83; Huronian: Parks, 00
- Multiple diabase dike: Lawson, 94a
- Muskoka district: Lindsay, 13; Parks, 01
- Nagagami River region: Wilson (W J), 04
- Niagara escarpment, southwestern Ont.: Williams (M Y), 14c
- Niagara region: Grant (C C), 92a; Robb, 60; Spencer (J W), 81
- Nipigon region: Bell (R), 70a; Logan, 70a; Parks, 02
- Nipigon series: Spencer (J W), 76a
- Nipissing district: Miller (W G), 01
- Nipissing-Algoma boundary: Burwash, 97; Parks, 99
- Nipissing-Timiskaming area: Barlow, 99
- Norfolk Co.: De Cew, 61
- Northwestern Ont.: Coleman, 02; Parsons (A L), 18a
- Ogahalla to Collins, Northern Transcontinental Railway: Hopkins (P E), 18
- Onaping area: Collins, 12, 14, 17
- Ontario basin: Coleman, 17
- Ordovician formations: Cushing, 08; Foerste, 16
- Credit River: Parks, 13d
- eastern Ontario: Ami, 02j
- Lake Timiskaming: Williams (M Y), 15
- Oriskany sandstone: Stauffer, 12; age: De Cew, 62
- Oriskany sandstone and Ohio shale: Kindle, 14b
- Ottawa canal: Ells, 95b
- Ottawa region: Ami, 84b, 85, 87c, d, 88d, e, f, 89, 90a, 92a, 95c, 96a, 99g, 00, 02g; Anderson (W P), 82, 83; Ells, 96b, d, e, 98b, c, 00a, 01; Grant (J A), 64; Logan, 47; Raymond (P E), 13c; Selwyn, 82; Woodward (H), 89
- Paleozoic section, Hamilton: Parks, 13c
- Parry Island: Walker (T L), 13
- Pembroke sheet: Ells, 07b
- Peninsula between Lakes Huron and Erie: Murray, 52
- Perth and Ottawa City sheets: Ells, 98
- Petrolia oil field: Stansfield, 17
- Phosphatic nodules, Chazy formation, Ottawa: Ami, 88c
- Pigeon Point district: Van Hise, 11
- Porcupine gold area: Burrows (A G), 12, 13, 15; Dobbs, 14; Flynn, 11
- Port Arthur district, Lake Superior: Courtis, 87; McInnes, 01; pre-Cambrian: Parsons (A L), 13a
- Port Colborne region: Ashburner, 90; McRae, 89; Stauffer, 13a
- Port Coldwell area: Barlow, 13



## Ontario—Continued.

*Historical geology—Continued.*

- Potsdam and Calciferous: Ells, 95a  
 Pre-Cambrian: Adams (F D), 07; Collins (W H), 13e; Lawson, 16; Miller (W G), 15; Winchell (N H), 91b  
 classification: Miller (W G), 15a  
 Lake Huron region: Coleman, 14  
 Lake Timiskaming region: Miller (W G), 05, 05c  
 northern Ont.: Moore (E S), 12b  
 southeastern Ont.: Miller (W G), 14  
 Sudbury: Winchell (N H), 91f  
 Prince Edward and Hastings cos.: Ells, 04  
 Prince Edward Co.: Wilkins, 77  
 Rainy Lake region: Bigsby, 54; Coleman, 95, 95b; Lawson, 87a, 88, 91, 13d; McInnes, 97, 98; Van Hise, 11; Winchell (H V), 99  
 Couchiching series: Uglow, 13  
 Rainy River district: Merritt, 97; Parks, 98  
 Red Lake region: Dowling, 96  
 Renfrew Co.: Ells, 96a  
 Rideau lakes: Drummond, 95  
 Rockland, Russell Co.: Ami, 93a  
 Rockwood anticline: Williams (M Y), 17a  
 Round Lake-Abitibi River: Bolton, 03  
 Russell: Craig, 89  
 St. Clair tunnel: Adams, 92  
 St. Ignace Island, Lake Superior: Robb, 82  
 St. Lawrence Valley: Giroux, 96  
 Seine River and Lake Shebandowan areas: McInnes, 99  
 Severn River, headwaters: Camsell, 05  
 Severn River region: Low, 87  
 Shebandowan district: Nicholson, 73b  
 Silurian: Williams (M Y), 13b  
 Credit River: Parks, 13d  
 Manitoulin Island: Williams (M Y), 13a, 14a  
 southwestern Ont.: Williams (M Y), 14d, 15b, 16  
 Simcoe district: Johnston (W A), 09, 10, 11  
 Slate Islands, Lake Superior: Parsons (A L), 18  
 Southeastern Ont.: Murray, 52a; Vennor, 70, 72, 72a, 73, 74, 76  
 Southwestern Ont.: Hunt, 68b; Murray, 57b; Parks, 03a; Stauffer, 11, 14; Williams (M Y), 17  
 Steeprock Lake district: Lawson, 12; Smyth (H L), 91; Uglow, 13  
 Steeprock series: Rothpletz, 15  
 Structural relations, pre-Cambrian and Paleozoic rocks: Kindle, 15  
 Sudbury district: Baker (M B), 17; Barlow, 02, 03, 04; Bell (R), 91, 92, 92a; Coleman, 03, 04a, 05, 07a, 13, 13f, 14; Collins (W H), 14a; Silver, 02; Tanton, 17; Walker (T L), 95, 97  
 Sudbury series: Coleman, 14a  
 Sudbury-Cobalt-Porcupine region: Miller (W G), 13  
 Superior and Huron lakes region: Rottermund, 56, 57  
 Swastika gold area: Bruce, 12  
 Sylvania sandrock contour: Nattress, 10  
 Temagami area: Miller (W G), 13  
 Thedford: Williams (M Y), 14b  
 Thessalon area, Lake Huron: Knight (C W), 15

## Ontario—Continued.

*Historical geology—Continued.*

- Thessalon River region: Murray, 59  
 Thousand Islands: Coleman, 92; Admiralty group: Adams (F D), 97a  
 Thunder Bay district: Ingall, 87; Nicholson, 73b; Lawson, 90c  
 Timagami district: Barlow, 04a  
 Timagami Lake region: Young (G A), 05  
 Timiskaming district: Baker (M B), 17; Burrows (A G), 14  
 Toronto region: Ami, 00; Coleman, 13e, j, 14b, 17; Hind, 53; Calciferous boulders: Hinde, 78  
 Trenton group: Raymond (P E), 14c  
 Unconformity at base of Onondaga: Kindle, 13b  
 Upper lakes region: Coleman, 99  
 Utica slate, Ottawa region: Ami, 82a, b, 87b, 88b, 92d  
 Victoria, Peterborough and Hastings cos.: Adams (F D), 94  
 Western Ont.: Brent, 03; Coleman, 96, 97, 98; Dowling, 94; Hille, 05; McInnes, 99a  
 Western Peninsula: Parks, 13d  
 West Shining Tree gold district: Stewart (R B), 12, 13a  
 Winisk River, northern Ont.: McInnes, 04, 05  
 Winnipeg to Cochrane: Collins (W H), 13d  
 Woods Location, Lake Superior: Macfarlane, 69  
*Mineralogy.*  
 Allanite (orthite): Chapman (E J), 64a  
 Andradite: Harrington, 96  
 Anhydrite: Nicol, 96  
 Antholite, Elzvir: Coleman, 94b  
 Anthraxolite, Sudbury: Mickel, 97  
 Barium, concentration in limestone, Kingston: Dickson, 02  
 Cacoclasite, Wakefield: Lewis (H C), 84b  
 Cancrinite, Dungannon: Barlow, 97a  
 Catalog, with notes: Miller (W G), 00  
 Celestite, Kingston: Baddeley, 30  
 Cobalt area: Miller (W G), 13a  
 Cobalt minerals: Ellsworth (H V), 16  
 Cobaltite: DeLury, 06  
 Corundum: Miller (W G), 99  
 Datolite, Loughboro: Pirsson, 93  
 Euxenite: Miller (W G), 17; South Sherbrooke: Miller (W G), 17b  
 Gedrite: Evans (N N), 08  
 General: Chapman (E J), 64; Coleman, 93; Willimott, 83  
 Hamilton: Grant (C C), 97b  
 Harmotome, Port Arthur: Ferrier, 91a  
 Hastingsite, Dungannon: Graham (R P D), 09b  
 Huronite: Barlow, 95a  
 Lake Superior: Chapman (E J), 65; north shore: Delafield, 24  
 Meteorite, De Cewsville: Howell (E E), 90a  
 Shelburne, Grey Co.: Borgström, 05; Farrington, 06; Johnston (R A A), 05a  
 Welland: Howell (E E), 90a  
 Nickel minerals, Sudbury: Emmens, 92  
 Nickeliferous pyrite, Sudbury: Walker (T L), 94  
 Orthoclase enclosing pyroxene, Renfrew Co.: Luquer, 93  
 Ottawa district: Willimott, 85a



## Ontario—Continued.

*Mineralogy*—Continued.

- Pentlandite, Sudbury: Penfield, 93b  
 Petalite: Troost, 24  
 Phlogopite, Frontenac Co.: McNairn, 01  
 Polycrase, Nipissing: Hoffmann, 99  
 Pseudomorph after laumontite: Graham (R P D), 06  
 Pyrrhotite, Elizabethtown: Harrington (B J), 76b; Frontenac Co.: Nicol, 98  
 Radioactive minerals: Brunton, 15  
 Rainy Lake region: Coleman, 95  
 Renfrew Co.: Goodwin, 98  
 Rutile-mica intergrowth: Pogue, 11  
 Scapolite, Frontenac Co.: Smith (G O), 94  
 Scorodite, Cobalt: Graham (R P D), 14  
 Sodalite, Hastings Co.: Luquer, 95  
 Sperrylite, Algoma district: Goldschmidt, 03; Penfield, 89; Walker (T L), 96; Wells, 89; Sudbury: Dickson, 03  
 Sudbury nickel ores: Coleman, 16c  
 Sundry minerals: Chapman (E J), 69a, 73; Troost, 25c  
 Temiskamite: Walker (T L), 14a  
 Wolfram, Lake Couchiching: Hunt, 60c  
 Xenotime, Calvin: Hoffmann, 98  
 Zircon, Renfrew Co.: Foote (A E), 84  
 Zonochlorite, Nipigon Bay, Lake Superior: Foote (A E), 73

*Paleontology*.

- Agelacrinites: Raymond (P E), 15  
 Agelacrinites billingsii, Peterboro: Chapman (E J), 60b, d  
 Annelid jaws: Hinde, 79a  
 Anthozoa, Devonian: Billings, 59f; Ordovician: Billings, 56e  
 Asaphus: Chapman (E J), 59  
 Ordovician: Chapman (E J), 58a  
 St. Joseph's Island: Stokes, 24  
 Asaphus megistos, Cobourg: Chapman (E J), 59a  
 Ascodictyon, Devonian: Nicholson, 77a  
 Astrocystites, Trenton, Ottawa: Whiteaves, 97a  
 Belleville district: Chapman (E J), 60a  
 Black River trilobites: Raymond (P E), 08b  
 Brachiopoda, Ordovician: Billings, 56j  
 Oxoplectia: Wilson (A E), 13  
 Silurian: Billings, 56g  
 Brockocystis: Foerste, 14b  
 Bryozoa, Devonian: Nicholson, 74e, 75g  
 Niagaran: Bassler, 06a  
 Ordovician: Nicholson, 75g  
 Caddis fly, Leda clays, Ottawa: Scudder, 95c  
 Calceocrinidae: Ringueberg, 89  
 Cambro-Silurian and Silurian fossils, Albany River region: Whiteaves, 09a  
 Carabidae, interglacial, Toronto: Scudder, 77a  
 Cervalces antler, Toronto interglacial: Bensley, 13  
 Chazy Pelecypoda: Whiteaves, 08  
 Coleoptera, interglacial, Scarboro: Scudder, 90g; Toronto: Scudder, 00a  
 Collecting notes: Grant (C C), 06, 07  
 Columnopora, Ordovician: Nicholson, 74i  
 Conodonts: Hinde, 79  
 Conularia, Hamilton: Anon, 79  
 Crinoidea, Trenton: Billings, 56c; Ottawa region: Billings (W R), 85, 87

## Ontario—Continued.

*Paleontology*—Continued.

- Cryptophragmus: Raymond (P E), 14b  
 Cybele: Narraway, 06  
 Cypridina antiqua, Trenton: Jones (T R), 04  
 Cyrtina, Walpole: Billings, 63c  
 Cystid from Clinton: Parks, 10a  
 Cystidea, Trenton limestone: Billings, 54  
 Cystiphyllum, Wainfleet, Devonian: Nicholson, 75f  
 Devonian: Billings, 60, 74a; Grant (C C), 95a; Nicholson, 74, 74a, c, h, 75  
 Kwataboahegan River: Parks, 04  
 Onondaga limestone: Stauffer, 18  
 Drift boulders, fossils: Grant (C C), 97  
 Eastern Ont.: Ami, 04  
 Echinodermata, Trenton: Billings (W R), 81, 83  
 Ekwan River region, Silurian: Whiteaves, 04  
 Elephas, Burlington Heights: Cottle, 52; Hamilton: Billings, 63d  
 Eozoon: Dawson, 68  
 Estheria, Leda clays: Packard (A S), 81a  
 Eurypterid fauna, Niagara formation: Williams (M Y), 15a  
 Favosites, Devonian: Nicholson, 73d  
 Gastropoda, Guelph formation: Nicholson, 75e  
 Graptolites, Niagaran, Hamilton: Grant (C C), 96a; Spencer (J W), 78, 83a; Niagaran dolomite: Bassler, 09a  
 Grenville sheet: Ami, 01a  
 Guelph: Nicholson, 75i; Whiteaves, 84, 95, 06c; Gastropoda: Nicholson, 75e  
 Guelph, Onondaga, and Hamilton faunas: Parks, 13b  
 Hagersville district, Oriskany and Onondaga faunas: Stauffer, 13  
 Hamilton: Grant (C C), 92c, 93, 95, 96, 97a, 98, 99, 00a, 01, 01a, 02b, 03, 04, 05, 08, 10; chert beds: Grant (C C), 94  
 Hamilton fossils: Billings, 57b; Calvin, 88b; Whiteaves, 89, 98; Williams (M Y), 13  
 Harpes, Ottawa: Billings, 63b  
 Hybocystis: Parks, 08b  
 Hystericinus, Hamilton group, Arkona: Hinde, 85  
 Insecta, Leda clays, Ottawa region: Ami, 95d  
 Interglacial fossils, Toronto: Coleman, 94  
 Kingston area: Wilson (A E), 16  
 Labechia: Lambe, 99d  
 Lake Huron region: Bigsby, 24  
 Lake Ontario, western end: Spencer (J W), 82  
 Laurentian fossils: Dawson (J W), 67a  
 Manitou Islands, Lake Nipissing: Ami, 92c  
 Marine shells in Lake Ontario region: Desor, 51a  
 Mastodon: C, 55; western Ontario: Ami, 98a  
 Mastodon and mammoth: Panton, 91  
 Matheria brevis, Ottawa: Whiteaves, 03c  
 Mollusca, Mackay Lake, Ottawa: Whittaker, 18  
 Moose River: Whiteaves, 77a  
 Norfolk Co.: De Cew, 61  
 Nucleocrinus, Whidder: Montgomery (H), 81  
 Opercula, paucispiral, Guelph formation: Whiteaves, 91c  
 Ordovician: Chapman (E J), 59b; Nicholson, 75; Nipissing-Timiskaming area: Ami, 99  
 Oriskany fossils: Schuchert, 89  
 Orthocerata, Lake Huron region: Stokes, 40



## Ontario—Continued.

*Paleontology—Continued.*

- Ottawa region: Ami, 85, 87c, d, 88d, 92a, 96a, 99g, 01, 02g; Stewart (J), 88; Whiteaves 83c; list of fossils: Ami, 84, 84a
- Ottawa River region: Salter, 52a
- Palæaster wilsoni: Raymond (P E), 12b
- Panenka, Corniferous: Whiteaves, 91d, 02
- Pelecypod, Ottawa: Wilson (A E), 15
- Pembroke sheet, lists of fossils: Ami, 07
- Periglyptocrinus priscus: Parks, 09a
- Phoca groenlandica, Russell Co.: Grant, 83
- Plantae, Don deposits: Penhallow, 05a
- Pleistocene, Green's Creek: Dawson (J W), 90f
- James Bay: Stimpson, 61
- Ottawa Valley: Ami, 97a
- Pleistocene echinoderm: Dawson (J W), 99
- Pleistocene flora: Penhallow, 07a; Don Valley: Penhallow, 99, 00a
- Porocrinus smithi, Belleville: Grant (J), 81
- Pre-Cambrian: Miller (W G), 11b
- Protaster: Parks, 08a, 09
- Protichnites and Climactichnites: Chapman (E J), 77
- Protopalæaster narrawayi: Raymond (P E), 12c
- Pterygotus, Hamilton: Dawson (J W), 79d
- Quaternary Mollusca, Nottawasaga River: Chapman (E J), 61b
- Russell Co.: Ami, 89, 93a
- Scolithus, Chazy formation, Ottawa: Ami, 87
- Seal, Leda clay, Ottawa Valley: Dawson (J W), 77e; post-Pliocene, Ottawa River: Leidy, 56f
- Shark, fin spine, Corniferous, St. Mary's: Lennox, 86
- Silurian: Billings, 56b, 74a; Nicholson, 74b, 75
- Fawn and Severn rivers: Parks, 13
- Niagara: Spencer (J W), 84
- Patricia: Parks (W A), 15
- plants, Hamilton: Grant (C C), 92
- Siphonotreta, Utica formation, Ottawa: Whiteaves, 82
- Siphonotreta scotica: Ami, 87b
- Spongida, Hamilton: Walker (A E), 95
- Starfish with ambulacral covering plates: Hudson, 12a
- Steep Rock series: Rothpletz, 15; Walcott, 12a
- Steliella (sponge), Trenton, Ottawa: Hinde; 89
- Stephanella, Ottawa: Hinde, 91
- Stromatopora: Nicholson, 73a, 74d
- Stromatoporidae: Walker (A E), 91
- Stromatoporoidea, Devonian: Nicholson, 87; Guelph formation: Parks (W A), 07
- Syringolites, Manitoulin: Hinde, 79b
- Thresherodiscus: Foerste, 14b
- Toronto, Ordovician: Smith (J F jr), 59
- Tracks of organic origin in Animikie rocks: Matthew (G F), 90d
- Trenton, Cumberland, Russell Co.: Ami, 00h
- Ottawa region: Billings (W R), 85a
- Port Hope: Ami, 93
- Wolfe Island: Mather, 17b
- Trenton echinoderm fauna, Kirkfield: Springer, 11b
- Triarthrus, Whitby: Smith (J F jr), 61
- Trilobites, Chazy near Ottawa: Raymond (P E), 10e

## Ontario—Continued.

*Paleontology—Continued.*

- Trilobites: Lowville and Black River formations: Raymond (P E), 10a
- Ordovician: Billings, 59d
- Ottawa: Narraway, 12
- Trimerella, Keewatin: Whiteaves, 02a
- Tristylotus, Devonian, Hudson Bay slope: Parks, 04a
- Trocholites: Whiteaves, 04a
- Turrilepas, Utica, Ottawa: Woodward (H), 89
- Unionidae, drift deposits: Simpson (C T), 93
- Utica slate: Ami, 82a, 88b
- Whale, Smith's Falls: Dawson (J W), 83b
- Worm-burrows, supposed, Laurentian rocks: Dawson (J W), 66a
- Petrology.*
- Abitibi region: Kay, 04; McMillan, 05
- Amphibolites of the Laurentian area: Adams (F D), 09a
- Analcite rock, Lake Superior: Coleman, 99g
- Animikie rocks, Thunder Bay: Ingall, 92
- Anorthosites, Rainy Lake region: Coleman, 96b
- Central Ont.: Barlow, 15
- Chrome-bearing peridotites of Lake Abitibi: White (H T), 10
- Clear Lake region: Coleman, 93a
- Corundiferous nepheline syenite: Coleman, 99a, h
- Diabase and aplite of cobalt-silver area: Bowen (N L), 10a
- Diabase and granophyre of Gowganda district: Bowen (N L), 10
- Diabase of Cobalt district: Hore, 10
- Diabase dikes, Thousand Islands: Smyth (C H), 94c
- Dikes, containing huronite: Barlow, 95a
- Frontenac, Leeds, and Lanark cos.: Miller (W G), 96
- Rainy Lake region: Lawson, 91
- Dolomites, Nipissing district: Davis (N B), 11
- Drift, microscopic petrography: Coleman, 88
- Drift rocks, central Ont.: Coleman, 91
- Dungannon, Hastings Co.: Adams (F D), 96b
- Eastern Ont.: Barlow, 01a
- General: Coleman, 98a
- Glamorgan Township, Haliburton Co.: Foye, 16a; Graton, 03a
- Gowganda district: Collins (W H), 09
- Granite, nodular, Pine Lake: Adams (F D), 98a; Evans (N N), 98
- Grenville region: Harrington (B J), 77
- Haliburton-Bancroft area: Adams (F D), 13b; intrusions: Foye, 16
- Heronite: Coleman, 00c
- Huronian, Sudbury: Bonney, 88
- Keweenawan diabases near Lake Nipigon: Moore (E S), 11
- Kingston district: Miller (W G), 97
- Laccolithic sills, northwest coast of Lake Superior: Lawson, 93a
- Lake Nipigon-Clay Lake region: Collins (W H), 09a
- Lake Superior region: Macfarlane, 67
- Laurentian limestones, metamorphism: Graton, 03a
- Malignite, Poohbah Lake: Lawson, 96



## Ontario—Continued.

*Petrology—Continued.*

- Michipicoten area: Bell (J M), 06; Coleman, 02c; Tight, 87  
 Michipicoten Island: Burwash, 05  
 Nepheline and associated syenites: Adams (F D), 08c  
 Nepheline rock: Adams (F D), 04a  
 Nepheline syenite: Adams (F D), 07a  
   Dungannon: Adams (F D), 94a; Harrington (B J), 94a  
   Haliburton Co.: Foye, 15  
   Port Coldwell: Kerr, 10  
   western Ont.: Miller (W G), 03a  
 Nepheline syenite areas: Miller (W G), 01a  
 Nepheline-bearing area, Lake Superior: Adams (F D), 00  
 Nickel, Sudbury: Goodwin, 93  
 Nipissing district: Hore, 11; Uglow, 11a  
 Nipissing-Timiskaming area: Barlow, 99  
 Onaman iron range: Moore (E S), 09b  
 Onaping area: Collins, 17  
 Porcupine district: Stansfield, 11; Whitman, 16  
 Port Coldwell area, nepheline and alkali syenites: Barlow, 13  
 Pre-Cambrian, Lake Huron region: Coleman, 14  
 Quartz diabases, Nipissing district: Collins (W H), 10a  
 Rainy Lake region: Lawson, 88, 13d; diabase dikes: Lawson, 88a  
 Seskinaka: Spearman, 15  
 Sudbury district: Barlow, 03; Coleman, 05; Howe, 14; Walker (T L), 95, 97; Williams (G H), 91  
   breccia: Williams (G H), 91a  
   Levack: Brackenbury, 14  
 Sunbury minerals, quantitative measurement: Dresser, 17  
 Swastika gold area: Bruce, 12  
 Syenites, Port Coldwell: Coleman, 02b, i  
 Thousand Islands: Coleman, 92; Admiralty group: Adams (F D), 97a  
 Thunder Bay district: Bayley, 88  
 Woods Location, Lake Superior: Macfarlane, 69
- Physical geology.*  
 Archean conglomerates, origin: Barlow, 99a  
 Bell River region, differential rising: Bell (R), 97a  
 Burlington Beach, formation: Van Wagner, 84  
 Calcareous concretions, Kettle Point, Lambton Co.: Daly (R A), 00  
 Carbonaceous schists, Lake of the Woods: Greenland, 13  
 Caves and potholes, Rockwood: Panton, 89  
 Crustal warping in Temagami-Timiskaming district: Pirsson, 10a  
 Deformation of unconsolidated beds: Kindle, 17b  
 Dikes, Frontenac, Leeds, and Lanark cos.: Miller (W G), 96  
 Dikes containing huronite: Barlow, 95a  
 Earthquake, February 10, 1914: Klotz, 15a; April 28, 1913: Klotz, 13  
 Erosion, Don Valley: Harvey (A), 89  
 Faulting, Ottawa: Ami, 88d  
   postglacial, near Banning: Lawson, 11a  
 Fracture systems: Hobbs, 05

## Ontario—Continued.

*Physical geology—Continued.*

- Glacial markings, Laurentian Hills: Andrews (E), 83  
 Granitization of Huronian schists: Bell (J M), 06  
 Honeycombed limestone in Lake Huron: Bell (R), 95a  
 Ice action: Bleasdel, 76  
 Ice phenomena, Rice Lake: Dumble, 58  
 Landslide, Brantford: Spencer (J W), 85, 87a  
 Lorraine shales, recent folds: Wilson (A W G), 02a  
 Metamorphism, in pre-Cambrian: Coleman, 12a; Rideau Lake: Willcox, 93  
 Ottawa district: Ells, 98b  
 Pre-Paleozoic decay of rocks: Bell (R), 94a  
 Potholes: McKellar, 90  
 Recent rock movements: Mills (S D), 04  
 Ripple marks, Ottawa: Kindle, 14d  
 Ripple-marked Huronian quartzite, Cobalt: Hore, 13i  
 Seismological observations, Toronto: Stupart, 98  
 Toronto Island, formation: Clark (L J), 91  
 Wakefield cave: Dawson (J W), 69a
- Physiographic geology.*  
 Algonquin and Nipissing shore lines: Goldthwait, 09b, 10  
 Algonquin beach, deformation: Spencer (J W), 91c; glacial phenomena: Johnston (W A), 13; Lake Simcoe district: Hunter, 03; Johnston (W A), 16a  
 Beaches, abandoned: Spencer (J W), 91d; north of Lake Superior: Taylor (F B), 97e; on islands in Georgian Bay: Comstock (F M), 04  
 Beaches, marine and freshwater: Coleman, 01c  
 Central Ont.: Wilson (A W G), 01  
 Champlain sea in Lake Ontario basin: Mather, 17a  
 Cuspate forelands, Bay of Quinte: Wilson (A W G), 04a  
 Don River glacial deposits, Toronto: Wright (G F), 14  
 Drift deposits: Chapman (E J), 61  
   classification and nomenclature: Coleman, 09c  
   Lake Ontario region: Spencer (J W), 92b  
   north of Lake Ontario: Spencer (J W), 88b  
   western Ont.: Bigsby, 51  
 Dundas Valley, surface geology: Kennedy, 84  
 Eastern Ont.: Ells, 00b  
 Espanola district: Quirke, 17  
 Galt moraine: Taylor, 99a  
 General: Bigsby, 29a; Kindle, 15  
 Glacial and interglacial deposits, Toronto: Coleman, 95a  
 Glacial drainage, Simcoe area: Taylor (F B), 97i  
 Glacial Lake Ojibway: Coleman, 09b, 10e  
 Glacial phenomena, eastern Ont.: Taylor (F B), 01  
 Glacial phenomena, Toronto: Coleman, 13c  
 Glaciation: Dawson (J W), 61d; Willcox, 84  
   Ottawa region: Ami, 87a; Bowman (A), 88a; Johnston (W A), 16b



## Ontario—Continued.

*Physiographic geology—Continued.*

- Huron Co.: Gibson, 73  
 Huronian rocks of Nipissing, glacial origin:  
   Hore, 10a  
 Interglacial period, earliest: Coleman, 15a  
 Iroquois beach: Coleman, 99d, 04b, c, 13d;  
   Spencer (J W), 90c, 92; deformation:  
   Spencer (J W), 90b  
 Keewatin climate and physical conditions:  
   Coleman, 11  
 Keewatin glacier: Tyrrell, 98a  
 Kincardine region: Jefferson, 03  
 Kingston region: Drummond, 92  
 Lake Agassiz: Johnston (W A), 17b; genesis:  
   Johnston (W A), 16c  
 Lake Erie, history: Spencer (J W), 94d  
 Lake Huron region: Goldthwait, 09a  
 Lake Iroquois and predecessors, Toronto:  
   Coleman, 99f  
 Lake Ontario, western end, surface geology:  
   Spencer (J W), 82a  
 Lake Superior region: Harvey (A), 89a; Law-  
   son, 93b  
 Lincoln Co., surface geology: Wilkins, 91  
 Lundy beach: Spencer (J W), 94d  
 Mattawa Valley: Taylor (F B), 97f  
 Montreal River, diversion of: Bell (R), 10a  
 Moraine of retrocession: Wright (G F), 90a  
 Moraines: Taylor (F B), 12a, 13b  
   Georgian Bay: Taylor (F B), 98a  
   southwestern Ont.: Taylor (F B), 13c  
 Munuscong Islands: Taylor (F B), 95  
 Niagara Falls: Spencer (J W), 06, 07, 07a, 13c;  
   Taylor (F B), 13a  
 Niagara region, ancient drainage: Currie, 01  
 Niagara River region: Spencer (J W), 81, 87b  
 Nipissing beach, Lake Superior region: Taylor  
   (F B), 95b  
 Nipissing strait: Taylor (F B), 94  
 Nottawasaga Valley: Fleming, 53  
 Old gorge at Niagara: Claypole, 86a  
 Ontario shore line, age and origin: Spencer  
   (J W), 17  
 Ottawa beach of Champlain sea: Kindle, 18b  
 Ottawa canal: Ells, 95b  
 Ottawa River, ancient channels: Ells, 01e  
 Ottawa Valley: Ells, 94b; upper: Odum, 84  
 Patrician glacier, Tyrrell, 13b  
 Pleistocene deposits: Coleman, 99e; Taylor  
   (F B), 10a  
   James Bay: Stimpson, 61  
   north of Lake Ontario: Wilson (A W G), 05a  
   Ottawa area: Johnston (W A), 17; Wilson  
   (W J), 98  
   southwestern Ont.: Taylor (F B), 09, 12  
   Toronto: Coleman, 97c  
 Postglacial submergence, limit: Taylor (F B),  
   94c  
 Quaternary, Mattawa and Ottawa valleys:  
   Taylor (F B), 96b  
 Rainy River district, Pleistocene: Johnston  
   (W A), 14a, 15  
 Raised shore lines, St. Lawrence Valley and  
   Great Lakes: Chalmers, 04a  
 Recent deposits, Ottawa Valley: Ells, 94b  
 River valleys, Niagara escarpment: Wilkins,  
   90

## Ontario—Continued.

*Physiographic geology—Continued.*

- Rock basins, Michipicoten: Coleman, 02d  
 Russell: Craig (W), 89  
 Sea beaches, eastern Ont.: Coleman, 01b  
 Shore-lines, Lakes Ontario and Erie: Wilson  
   (A W G), 08  
   between Georgian Bay and the Ottawa  
   River: Hunter, 08  
 Blue Mountain escarpment: Hunter, 05  
 St. Joseph Island, Lake Huron: Leverett,  
   14c  
 Superficial deposits: Wilkins, 76; near Ottawa:  
   Keele, 13  
 Surface geology: Chalmers, 02a, 03  
 Terraces: Roy, 37; Lake Erie: Desor, 50h  
 Terraces and beaches, Lake Ontario: Spencer  
   (J W), 83  
 Toronto region, drift deposits: Coleman, 02f,  
   Hinde, 77; Davenport gravel drift:  
   Fleming, 61  
   glacial and interglacial beds: Coleman, 01d  
   moraines: Taylor (F B), 13b  
   shore lines: Gilbert, 88  
 Toronto and Scarboro drift: Upham, 01a  
 Trent River system: Wilson (A W G), 04  
*Underground water.*  
 General: Ingall, 12  
 Ontario Beach quadrangle, N. Y.: Hartnagel, 07b  
 Ontario iron mine, N. Y.: Taylor (C F), 12  
 Ontario mineral belt, Utah: Jenney, 06, 06a, 06c  
 Ontario shore line, age and origin: Spencer (J W),  
   17  
 Onychaster, structure: Schöndorf, 09  
 Onychocrinus: Springer, 06  
 Onyx.  
   Colorado: Bailar, 08  
   Kentucky, Barren Co.: Gorby, 99  
   Mexico: Aguilera, 08a; Lawton, 10  
   Coahuila, Jimulco: Ordóñez, 05h  
   Oaxaca, Tehuantepec district: Flores, 09b  
   Pacific Coast: Falkenau, 92  
   Tennessee: Gordon (C H), 12  
 Onyx marble: De Kalb, 96; Merrill (G P), 95  
 Oolite.  
   General: Rothpletz, 92  
   Indiana: Blatchley (W S), 01b  
   New York, Orange Co.: Young (J P), 31  
   Organic oolite, Ordovician: Van Tuyl, 16e  
   Origin: Brown (E P), 13; Brown (T C), 14;  
   Bucher, 18; Herrera, 16; Hopkins (T C),  
   97a; Vaughan, 13, 13a, 14b; Van Tuyl,  
   16d; Virlet d'Aoust, 57; Wallis, 15; Wie-  
   land, 14; in shale: Tarr (W A), 18b;  
   inorganic origin: Bucher, 18a  
   Pennsylvania, Bethlehem: Wherry, 15; cen-  
   tral: Ziegler, 12  
   Siliceous: Hovey, 94b; Tarr (W A), 18d  
   origin: Wieland, 97b  
   Pennsylvania: Moore (E S), 12  
   structure: Hovey, 94b  
   Structure: Barbour, 90a  
   Types of Paleozoic oolite: Van Tuyl, 18b  
 Opal, Mexico, Queretaro: Foote (A E), 86  
 Opatatika Lake district, Que.: Cirkel, 09b; Harvie,  
   11b  
 Ophiolites, Green Mountains: Hunt, 57c



Ophir mining district, Cal.: Lindgren, 94b

Ophir Loop, diorite: Cross, 96a

Opisthias rarus: Gilmore, 09a

Opisthotonos: Moodie, 18d

Optical mineralogy: Luquer, 96b

Orange group: Cairnes, 12e

Orange sand, age: Chamberlin (T C), 91; Salisbury 91

Orange sands, Mississippi basin: Salisbury, 92b

Ordovician. *See also* Paleontology, Ordovician

Alabama: Smith (E A), 76

Birmingham district: Burchard, 10c; Butts, 07, 10a; Gibson, 93

Cahaba region: Smith (E A), 90a

Gadsden quadrangle: Hayes, 96

northeastern: Hayes, 92

northern: McCalley, 81

Stevenson quadrangle: Hayes, 95

Tennessee Valley: McCalley, 96

Alaska, Cosna-Nowitna region: Eakin, 18

Fairbanks quadrangle: Prindle, 13

Mount McKinley region: Brooks, 11

Porcupine River: Kindle, 08a

Seward Peninsula: Collier, 02, 08a; Kindle, 11d

Solomon and Casadepaga quadrangles: Smith (P S), 10

southeastern: Kirk, 18b

upper Yukon: Brooks, 07c, 08a

Alaska-Yukon boundary: Cairnes, 12a, 14b

Alberta, Robson Peak district: Walcott, 10

Rocky Mountain region: McConnell, 87

Anticosti Island: Twenhofel, 14

Appalachians: Keith, 94a; southern: Elliott (J B), 83; age: Bradley, 75

Arctic regions: De Rance, 78; McMillan, 10

Baffin Land, Trenton: Schuchert, 00

Ellesmere Land: Holtedahl, 13, 17

Frobisher Bay: Stevens (R P), 63

Arizona: Ransome, 16

Clifton quadrangle: Lindgren, 05

Clifton-Morenci district: Lindgren, 05a

Arkansas: Branner, 96a; Purdue, 09; Williams (H S), 00a

Ouachita area: Purdue, 09a

Batesville district: Williams (H S), 94b

Caddo Gap and De Queen quadrangles: Miser, 17

Eureka Springs and Harrison quadrangles: Purdue, 16

Fayetteville quadrangle: Adams (G I), 05

graptolite shales: Gurley (R R), 92

Hot Springs area: Purdue, 10a

northern: Adams (G I), 04; Purdue, 07a; Ulrich, 04

novaculite region: Griswold, 92; Prosser, 92

Ozark region: Purdue, 07

slate area: Purdue, 10

Arnheim formation: Foerste, 12b

Beekmantown, Champlain Valley: Brainerd, 90a

British Columbia, Cambro-Ordovician boundary: Walcott, 10

Cordilleran formations: Daly (R A), 13a

East Kootenay district: Schofield, 14

Field area: Allan, 12, 14

Kicking Horse Pass: Lapworth, 87a

Ordovician—Continued.

British Columbia, Robson Peak district: Walcott, 10

Rocky Mountains: Allan, 13

Selkirk and Purcell Mountains: Daly (R A), 14a

Calcareous formation, Champlain Valley: Brainerd, 90

California: Smith (J P), 16

eastern: Ball (S H), 07

Inyo and White Mountains: Knopf, 14a

Inyo Range: Kirk, 18

Canada: Ami, 00a, 01h; Billings, 60d; Logan, 53, 61, 62, 63; Selwyn, 82, 84

Atlantic coast region: Matthew (G F), 95b

eastern: Dawson (J W), 88h

maritime provinces: Matthew (G F), 08a

Ottawa Valley, Chazy formation: Raymond (P E), 11a, d

St. Lawrence Valley: Kindle, 15

Catoctin belt: Keith, 94a

Champlain Valley: White (T G), 00

Chazy formation, Champlain Valley: Brainerd, 88, 91, 96; Raymond (P E), 05b, 16b

Cincinnati anticline, age and development: Foerste, 91, 99; southern Kentucky: Foerste, 02

Cincinnati group: Meek, 65g; Miller (S A), 74a; Orton, 73; Perry (N W), 89; Tennessee: Foerste, 03a

Cincinnati period: Hitchcock (C H), 79b

Cincinnati region: Foerste, 05b, 12a

Cincinnati: Braun, 16; James (U P), 83 catalog: James (U P), 71

Indiana: Cumings, 01c

Cincinnati sedimentation: James (J F), 89

Classification: Grabau, 09

Colorado: Darton, 06b, f

Alma district: Patton, 12

Anthracite and Crested Butte quadrangles: Eldridge, 94

Castle Rock quadrangle: Richardson (G B), 15

Castle Rock region: Lee (W T), 02b

Colorado Springs quadrangle: Finlay (G I), 16

Front Range: Hayden, 76

Gold Brick district: Crawford (R D), 16

Monarch and Tomichi districts: Crawford (R D), 13

Monarch district: Crawford (R D), 10

Pikes Peak sheet: Cross, 94

Southern: Stevenson, 75

Comparison of American and European formations: Grabau, 16

Conglomerates in Galena series: Sardeson, 98

Connecticut: Gregory (H E), 07a

Green Mountain region: Dana (J D), 73a

Taconic schists: Dana (J D), 79a

Correlation: Grabau, 13b; Raymond (P E), 16; Ulrich, 88a; Winchell (N H), 97

Cynthiana formation: Miller (A M), 15

Evolution of North America: Grabau, 09a

Fort Cassin beds, Vt.: Whitfield, 90, 90c

Galena and Maquoketa series: Sardeson, 97

Galena limestone, age: Winchell (N H), 95e



## Ordovician—Continued.

Galena series: Sardeson, 96, 07  
 General: Bassler, 11; Castelnau, 43, 43a; Clarke (J M), 18; Emmons (E), 54; Foster, 41; Hall, 42a, 52e, 61; Hunt, 72a; Miller (S A), 81e; Schuchert, 13d; Sharpe, 48; Ulrich, 11a; Winchell (N H), 88g  
 Georgia: McCallie, 10; Veatch (J O), 09; Watson, 06  
   Appalachian Valley: Shearer, 18a  
   northern: Maynard, 12  
   northwestern: Hayes, 91; Spencer (J W), 93  
   Polk Co.: Spencer (J W), 91a  
   Ringgold sheet: Hayes, 94  
   Rome quadrangle: Hayes, 02  
 Great Plains: Darton, 05  
 Green Mountain region: Dana (J D), 73a  
 Hudson River group: Meek, 67a; nomenclature: Hall, 78a  
 "Hudson River group:" Walcott, 90b  
 Idaho, eastern: Umpleby, 12  
   Lemhi Co.: Umpleby, 13  
   Mackay region: Umpleby, 17  
   phosphate reserve: Richards (R W), 11b  
   southeastern: Schultz, 18  
 Illinois: Bain, 06; Bannister, 70; Bradley, 70; Shaw (J), 73; Weller, 06a; Worthen, 66, 68a, 70, 73a  
   Alexander Co.: Savage, 09a  
   Bond, Macoupin, and Montgomery cos.: Blatchley (R S), 14  
   Calhoun Co.: Weller, 07c  
   Cap au Gres: Keyes, 98n  
   East St. Louis district: Bowman (I), 07  
   Elkhorn Creek, St. Peter sandstone: Hershey, 94  
   Galena and Elizabeth quadrangles: Shaw (E W), 16; Trowbridge, 16  
   Galena series: Sardeson, 07  
   Hamburg section: Weller, 06  
   Jo Daviess Co.: Elizabeth sheet: Cox (G H), 10  
   La Salle: Cady, 12  
   La Salle Co.: Freeman (H C), 68  
   lead region: Whitney, 66c  
   northern: Udden, 95  
   northwestern: Bain, 05a; Carman, 09; Cox (G H), 14  
   Peoria: Udden, 08c  
   Peoria quadrangle: Udden, 12  
   Pre-Richmond unconformity: Weller, 07b  
   Red River valley: Everett, 61  
   Rock Island: Udden, 96  
   St. Louis quadrangle: Fenneman, 11  
   southern: Savage, 10a  
   southwestern: Savage, 08  
   Starved Rock State Park: Cady, 18  
   Stephenson Co.: Hershey, 93a  
   Thebes sandstone: Savage, 18b  
 Indiana: Bassler, 06; Cox (E T), 79; Foerste, 04, 04a, b; Greene (G K), 98; Leverett, 89a  
   Cincinnati series: Cumings, 08  
   Clark and Floyd cos.: Borden, 74  
   Dearborn Co.: Bigney, 16  
   Dearborn, Ohio, and Switzerland cos.: Warder, 72  
   Decatur Co.: Elrod, 83

## Ordovician—Continued.

Indiana: Fayette Co.: Elrod, 84  
   Franklin Co.: Haymond, 69  
   Jefferson Co.: Borden, 75a; Culbertson, 16  
   Jennings Co.: Borden, 76  
   Madison: Hubbard (G C), 92b  
   Richmond: Moore (J), 93a; Plummer, 43; Elkhorn Falls: Dennis, 99  
   Richmond beds: Coryell, 15a  
   Ripley Co.: Borden, 76  
   southeastern: Cumings, 01c; Foerste, 97, 00  
   southern: Newson, 03  
   Tanner's Creek: Cumings, 13  
   Trenton limestone: Orton, 89  
   Union Co.: Elrod, 84a  
   Vevay: Cumings, 01b  
   Wayne Co.: Cox (E T), 79  
 Intraformational contorted strata, Trenton Falls: Miller (W J), 15  
 Iowa: Bain, 06; Beyer, 06, 07b; Burchard, 07h; Calvin, 06a; Hall, 58; Keyes, 93a; Norton, 12; White (C A), 70  
   Allamakee Co.: Calvin, 95a  
   Bremer Co.: Norton, 06  
   Cedar Rapids: Norton, 95d  
   Clayton Co.: Leonard, 06  
   Clinton Co.: Udden (Jon A), 05  
   Delaware Co.: Calvin, 98  
   Dubuque Co.: Calvin, 00  
   eastern: Carman, 09  
   Fayette Co.: Savage, 05b; Maquoketa beds: Slocum, 16  
   Galena quadrangle: Shaw (E W), 16  
   Galena series: Sardeson, 07  
   Graf: Thomas (A O), 14  
   Howard Co.: Calvin, 03  
   Jackson Co.: Savage, 06a  
   Lancaster and Mineral Point quadrangles: Grant (U S), 07  
   northeastern: McGee, 91; Norton, 95a  
   Winnesheik Co.: Calvin, 06  
 Kentucky: Bassler, 06; Christy, 48; Foerste, 95, 01; Hall, 43c; Miller (A M), 06; Nickles, 05; Owen (D D), 56, 57  
   Bath Co.: Linney, 86  
   Blue Grass region: Matson, 09  
   central: Foerste, 13d; Linney, 82; Lyon, 57; Miller (A M), 05; Phalen, 17  
   Clark Co.: Linney, 85  
   Clinton Co.: Loughridge, 90  
   Cumberland Mountain region: Moore (P N), 78a  
   Dix River region: Foerste, 12  
   Fleming Co.: Linney, 86  
   Franklin Co.: Miller (A M), 14  
   Garrard Co.: Linney, 83  
   Georgetown quadrangle: Miller (A M), 13a  
   Henry Co.: Linney, 87; Norwood, 77a  
   Irvine field: Shaw (E W), 17  
   Jefferson Co.: Butts, 15  
   Lincoln Co.: Evans (H A), 89; Linney, 83a  
   Marion Co.: Knott, 85  
   Mason Co.: Linney, 86a  
   Mercer Co.: Linney, 83b  
   Montgomery Co.: Linney, 85  
   Nelson Co.: Linney, 84  
   north central: Foerste, 14



## Ordovician—Continued.

- Kentucky: Oldham Co.: Linney, 87  
 Richmond quadrangle: Campbell (M R), 98  
 Shelby Co.: Linney, 87  
 Spencer Co.: Linney, 84  
 Washington Co.: Linney, 83e  
 Wayne Co.: Munn, 14a  
 Lake Superior region: Brooks, 76a; Desor, 52c  
 Foster, 51c  
 Lévis: Raymond (P E), 14e  
 Loraine group: Hitchcock (C H), 79b  
 Manitoba: Hind, 59; McInnes, 13a; MacLean,  
 14; Malcolm, 13; Tyrrell, 92b  
 eastern: Dowling, 95  
 Hayes River region: Tyrrell, 13  
 Lake Winnipeg region: Dowling, 00a  
 Lake Winnipeg-Burntwood River region:  
 Dowling, 02; Tyrrell, 02  
 Red River valley: McCharles, 87; Panton, 83,  
 84a  
 Schist Lake district: Bruce, 17  
 southeastern: Wallace (R C), 17a  
 Stony Mountain: MacLean (A), 13  
 Wewusko Lake area: Bruce, 17  
 Maquoketa formation: Sardeson, 96; Shaw (E  
 W), 11i  
 Maquoketa shales, Iowa: James (J F), 89b, 90a,  
 e; Delaware Co.: Calvin, 95b  
 Maryland: Clark (W B), 97b, 06c; Prosser, 00b  
 Cockeysville marble: Mathews, 05a  
 Frederick Co.: Keyes, 90g  
 Harpers Ferry quadrangle: Keith, 94  
 Piedmont formations: Mathews, 05  
 Piedmont Plateau: Bassler, 18a, b; Mathews,  
 04  
 Martinsburg shale: Hintze, 18  
 Massachusetts: Emerson (B K), 17  
 Berkshire Co.: Dana (J D), 72g, 73b, 77b;  
 Emerson, 99  
 Green Mountain region: Dana (J D), 73a  
 Hampshire Co.: Emerson, 98  
 Hawley sheet: Emerson, 92  
 Holyoke quadrangle: Emerson, 98a  
 Mount Washington: Hobbs, 93  
 Rensselaer grit plateau: Dale, 93  
 Meteorology: Sardeson, 00  
 Michigan: Lane, 09a; Winchell (A), 61  
 Keweenaw Point: Wadsworth, 91  
 Lake Superior region: Foster, 51, 51c  
 Limestone Mountain, Houghton Co.: Case,  
 15a  
 Little Bay de Noquette: Foerste, 17e  
 Menominee district: Bayley, 04; Van Hise, 00  
 northern: Russell, 05a; Seaman, 94  
 Upper Peninsula: Hall, 51b; Rominger, 73;  
 copper region: Foster, 50a  
 Minnesota: Berkey, 06; Grout, 14; Hall, 69a;  
 Hall (C W); 89b; Kloos, 71, 77; Sardeson,  
 92, 01e; Shumard (B F), 52; Winchell  
 (N H), 73a, 01  
 central and western: Upham, 80  
 Chisago, Isanti, and Anoka cos.: Upham, 88  
 Dakota Co.: Winchell (N H), 88a  
 Dodge Co.: Harrington (M W), 76  
 Fillmore Co.: Winchell (N H), 76, 84a  
 Galena series: Sardeson, 07  
 Goodhue Co.: Winchell (N H), 88a

## Ordovician—Continued.

- Minnesota: Hennepin Co.: Winchell (N H),  
 77b, 88a  
 Houston Co.: Winchell (N H), 77a, 84a  
 Minneapolis: Herrick, 77  
 Minneapolis-St. Paul district: Sardeson, 16  
 Minnesota Valley: Winchell (N H), 74b  
 Northfield, Shakopee limestone: Chaney, 92  
 Olmsted Co.: Harrington (M W), 76, 84  
 Ramsey Co.: Winchell (N H), 78c, 88a  
 Rice Co.: Sperry, 78; Winchell (N H), 84a  
 southeastern: Hall (C W), 92  
 southern: Hall (C W), 11a; Hurlbut, 70  
 Steele Co.: Harrington (M W), 76, 84  
 Trenton limestone: Hall (C W), 89a  
 Wabasha Co.: Winchell (N H), 88a  
 Washington Co.: Winchell (N H), 88a  
 Winona Co.: Winchell (N H), 84a  
 Mississippi Valley: Hall, 57f; Winchell (N H), 97  
 historical sketch: Winchell (N H), 95  
 upper: Cox (G H), 11; Locke, 42; Owen (D D),  
 52  
 Missouri: Bain, 05e; Branson, 18a; Buckley, 04;  
 Gallaher, 00; King (H), 51; Shepard, 07;  
 Swallow, 55a, 58  
 Auburn chert: Branson, 09  
 barite districts: Tarr (W A), 18  
 Boone Co.: Broadhead, 98  
 Calhoun sheet: Marbut, 98  
 Cape Girardeau Co.: Shumard (B F), 63d, 73  
 Cole Co.: Broadhead, 74  
 Cooper Co.: Swallow, 55b  
 Crawford Co.: Shumard (B F), 73  
 east central: Broadhead, 73d  
 Franklin Co.: Shumard (B F), 55  
 Glen Park section: Weller, 06  
 Greene Co.: Shepard, 98, 15  
 Jefferson Co.: Shumard (B F), 73  
 Lincoln Co.: Potter, 73  
 Louisiana: Keyes, 97f  
 Miller Co.: Ball (S H), 03; Meek, 73c  
 Moniteau Co.: Meek, 55; Van Horn (F B), 05  
 Morgan Co.: Marbut, 08; Meek, 73c  
 northern: Hawn, 55  
 Ozark Co.: Shumard (B F), 73  
 Ozark region: Broadhead, 98; Buehler, 17;  
 Crane (G W), 12; Keyes, 95k  
 Perry Co.: Shumard (B F), 73  
 Phelps Co.: Shumard (B F), 73  
 Pike Co.: Rowley, 91a, 08  
 Ste. Genevieve Co.: Shumard (B F), 59b, 73  
 St. Louis quadrangle: Fenneman, 11  
 Saline Co.: Meek, 73c  
 southeastern: Buckley, 09; Shumard (B F),  
 55  
 Southwest Pacific Railroad line: Swallow, 59a  
 Wright Co.: Shumard (B F), 73  
 Nevada, Ely district: Spencer (A C), 17  
 Esmeralda Co.: Turner, 02  
 Hot Creek district: Whitney, 67c  
 northeastern: Emmons (W H), 10  
 Pioche Mountains: Pack, 06, 06a  
 Silver Peak quadrangle: Spurr, 06b; Turner,  
 09  
 southwestern: Ball (S H), 07  
 New Brunswick: Bailey (L W), 90a, 01a; Daw-  
 son (J W), 55; Ellis, 08a; Hind, 65; Mat-  
 thew (G F), 70; Young (G A), 10



## Ordovician—Continued.

New Brunswick: Bathurst district: Young (G A), 11a  
 northern: Bailey (L W), 87  
 northern and eastern: Ells, 83  
 St. John area: Hayes (A O), 14; McLearn, 15b  
 western: Bailey (L W), 86  
 York and Carleton cos.: Bailey (L W), 85a  
 Newfoundland: Hyatt, 85; Milne, 77; Murray, 66, 73a, 81; Weston, 96a  
 Bell Island: Hayes (A O), 15  
 Conception and Trinity bays: Van Ingen, 14a  
 Port au Port and St. George bays: Howley, 75  
 southeastern: Murray, 68a  
 White Bay: Howley, 03a  
 New Hampshire: Hitchcock (C H), 77  
 New Jersey: Cook (G H), 68; Foerste, 93b; Kummel, 09; Lewis (J V), 15; Weller, 03  
 Franklin Furnace: Kummel, 08a  
 Green Pond region: Darton, 94f; Kummel, 02a  
 Kittatinny Valley: Kummel, 01b; Weller, 01  
 Passaic quadrangle: Darton, 08b  
 Raritan quadrangle: Bayley, 14  
 New Mexico: Gordon (C H), 06; Lindgren, 10  
 central: Lee (W T), 08a  
 Deming quadrangle: Darton, 17  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Silver City quadrangle: Paige, 16  
 southern: Darton, 17a  
 New Richmond sandstone, northern Ill.: Cady, 17c  
 New York: Bigsby, 58; Brown (F C), 06; Clarke (J M), 03g, 08, 12; Conrad, 40a; Cushing, 11; Foerste, 16; Hall, 52d; Hartnagel, 12; Mather, 41a; Seely, 94  
 Adirondack Mountains: Kemp, 96f; Miller (W J), 13, 17a; northern: Cushing, 05a; southern: Kemp, 99a  
 Albany Co.: Darton, 94a  
 Becraft's Mountain: Davis (W M), 83c  
 Broadalbin quadrangle: Miller (W J), 11b  
 Champlain basin: Ruedemann, 07; Van Ingen, 96  
 Cliff Haven: Hudson, 18  
 Clinton Co.: Cushing, 94, 97, 01; Chazy: Cushing, 95  
 Columbia Co.: Bishop, 86a, 87; Dwight, 87a; Kimball, 90  
 Dutchess Co.: Dana (J D), 79a; Dwight, 79, 87; Merrill (F J H), 05a; Fort Cassin beds: Dwight, 01  
 eastern: Dale, 99; Hall, 64d  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Essex Co.: Kemp, 97; Crown Point section: Raymond (P E), 02; Essex and Willsboro townships: White (T G), 94  
 Frankfort and Utica shales: Ruedemann, 11a  
 Frankfort region: White (T G), 99  
 Glens Falls: White (T G), 00a  
 Highlands: Berkey, 07  
 Hudson River beds: Ruedemann, 01  
 Hudson Valley: Dale, 04a  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Lewis Co.: Hough, 47

## Ordovician—Continued.

New York: Little Falls dolomite: Ulrich, 10a  
 Little Falls quadrangle: Cushing, 65  
 Lorraine: Foerste, 14a  
 Medina sandstone: Grabau, 07g  
 Mohawk Valley: Beecher, 86a; Darton, 94c, 97; Hall, 86; Prosser, 97a, 00a; Calciferous: Cleland, 00  
 Montgomery Co.: Cumings, 00  
 New York district: Merrill (F J H), 02  
 northern: Emmons (E), 42, 42a  
 Ogdensburg region: Cushing, 16  
 Oneida conglomerate: Hartnagel, 07  
 Oneida Co.: Brigham, 89  
 Orange Co.: Darton, 85; Ries, 97b  
 Paleozoic section: Cushing, 08  
 Passaic quadrangle: Darton, 08b  
 Port Leyden quadrangle: Miller (W J), 10  
 Poughkeepsie region: Dale, 79, 79b, d; Dwight, 80a, 84b, 86; Gerard, 79  
 Poughkeepsie quadrangle: Gordon (C E), 10, 11  
 Rensselaer Co.: Ford (S W), 85; Ruedemann, 02  
 Rensselaer grit plateau: Dale, 93  
 Rondout: Van Ingen, 03  
 St. Lawrence Valley: Chadwick, 15  
 Saratoga Co.: Prosser, 00a  
 Saratoga Springs region: Cushing, 14  
 Schenectady: Ford (S W), 85a  
 Schodack Landing: Ford (S W), 84a  
 Schoharie section: Stevenson, 01  
 Schoharie Valley: Grabau, 06  
 Skunneunk Mountain: Darton, 94f  
 southeastern: Berkey, 11; Mather, 43; Merrill (F J H), 98  
 Third district: Vanuxem, 42  
 Thousand Islands region: Cushing, 10a  
 Trenton, Rensselaer Co.: Ruedemann, 01a  
 Trenton Falls: Hahn, 13; Renwick, 24; White (T G), 96  
 Trenton section: Raymond (P E), 03  
 Ulster Co.: Darton, 94b  
 Utica: Walcott, 88b  
 Wappinger limestone: Dwight, 83  
 Wappinger Valley: Dwight, 81  
 Westchester Co.: Dana (J D), 80d; Merrill (F J H), 05  
 New York series: Clarke (J M), 99i; revision: Chadwick, 08  
 North America: Murray, 66; Willis, 12  
 North Carolina: Bradley, 74c  
 Asheville quadrangle: Keith, 04  
 Virgilina district: Laney, 17  
 Northwest Territory: Keele, 10  
 Hudson Bay region: Tyrrell, 97  
 Nova Scotia: Dawson (J W), 55, 60b; Honeyman, 74  
 Annapolis Co.: Honeyman, 80  
 Antigonish Co.: Honeyman, 66  
 Arisaig area: Twenhofel, 13  
 Arisaig-Antigonish district: Williams (M Y), 12, 14  
 Cape Breton Island: Fletcher, 77, 78, 79; Gilpin, 86c, 92  
 eastern: Fletcher, 87  
 Halifax and Colchester cos.: Honeyman, 83b



## Ordovician—Continued.

- Nova Scotia: northern: Ells, 85a  
 Pictou and Colchester cos.: Fletcher, 92  
 Pictou coal field: Poole, 04  
 Oceanic current, Utica epoch: Ruedemann, 98a  
 Ohio: Bassler, 06; Bownocker, 15; Foerste, 95;  
 Hall, 43c; Newberry, 71, 73, 78; Orton, 88,  
 93a; Prosser, 05; Rogers (W B), 42a  
 Brown Co.: Herzer, 78  
 Butler Co.: Orton, 78  
 Cincinnati: Anthony, 47; Hall, 45c; Nickles,  
 02  
 Cincinnati group: Perry (N W), 89  
 Cincinnati region: Fenneman, 16  
 Dayton region: Van Cleve, 49  
 Findlay borings: Condit, 13  
 Greene Co.: Orton, 74  
 Hamilton Co.: Bell (T J), 82  
 Highland Co.: Orton, 71a  
 Montgomery Co.: Orton, 71  
 Oxford: James (J F), 87a, 88f  
 Point Pleasant beds: James (J F), 92  
 Preble Co.: Orton, 78  
 Richmond near Oxford: Shideler, 07  
 southwestern: Fuller, 12b; Locke, 38; Orton,  
 73  
 Todd's Fork: Foerste, 88a  
 Trenton limestone: Orton, 88b, 89  
 Warren Co.: Orton, 78  
 Waverly well: Bassler, 11a  
 Oklahoma: Gould, 05; Wallis, 15  
 Arbuckle Mountains: Reeds, 10; Taff, 04;  
 Vaughan, 99a  
 Muscogee quadrangle: Taff, 06  
 northeastern: Siebenthal, 08a; Snider, 12, 15  
 Ouachita Mountains: Hill (R T), 91a  
 southern: Hutchison, 11  
 Tablequah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Wichita Mountains: Bain, 00; Gould, 02, 04a;  
 Taff, 04; Vaughan, 99a  
 Ontario: Bell (R), 89b; Chapman (E J), 75; Ells,  
 95b; Foerste, 16; Knight (C W), 15a;  
 Logan, 54 b; Malcolm, 15; Murray, 45, 54a,  
 57; Raymond (P E), 12d  
 Albany River region: Whiteaves, 09a  
 Belleville district: Chapman (E J), 60a  
 Collingwood region: Chapman (E J), 60c;  
 Parks, 13d  
 correlation: Raymond (P E), 13j  
 Credit River area: Parks, 13d  
 eastern: Ami, 02j; Ells, 95a, 98, 00b, 03d, 04d;  
 Giroux, 96, 97  
 French River sheet: Bell (R), 98  
 Grenville sheet: Ells, 01a  
 Hamilton area: Parks, 13c  
 Hastings Co.: Chapman (E J), 60e; Wall-  
 bridge, 69  
 Kingston area: Kindle, 16  
 Kingston-Lake Simcoe region: Murray, 54  
 Lake Huron region: Murray, 49, 50  
 Lake Nipissing, Black River limestone:  
 Winchell (N H), 96c  
 Lake Simcoe area: Johnston (W A), 12, 14;  
 Lowville limestone: Johnston (W A), 13  
 Lake Timiskaming: Hume, 17; Williams  
 (M Y), 15

## Ordovician—Continued.

- Ontario: Manitoulin area: Foerste, 12c  
 Manitoulin Island: Bell (R), 66, 70; Foerste, 13  
 Nipissing-Timiskaming area: Barlow, 99  
 Ottawa: Ami, 85, 88f; Raymond (P E), 13c;  
 ripple marks: Kindle, 14d  
 Ottawa district: Ami, 87c, d, 88d, 92a, 96a,  
 99g; Ells, 96b, e, 98b, 00a, 01; Utica slate:  
 Ami, 82a, b, 88b  
 Ottawa Valley: Grant (J A), 64  
 Pembroke sheet: Ells, 07b  
 Russell Co., Rockland: Ami, 93a  
 St. Joseph Island: Locke, 47  
 Simcoe district: Johnston (W A), 09, 10  
 southeastern: Murray, 52a  
 southwestern: Murray, 57b  
 Toronto: Coleman, 13c, e, j; Hind, 53  
 Trenton group: Raymond (P E), 14c  
 Utica: Ami, 92d  
 Ozark region: Adams (G I), 01  
 Paleogeographic map: Willis, 09  
 Paleogeography: Ulrich, 09; of St. Peter time:  
 Berkey, 06  
 Pecatonica limestone: Hershey, 97a  
 Pennsylvania: Foerste, 93b; Lesley, 92; Rog-  
 ers (H D), 58  
 Bedford Co.: Stevenson, 85  
 Bellefonte: Collie, 03  
 Berks Co.: D'Invilliers, 83  
 Blair and Huntington cos. section: Butts, 18  
 Blair Co.: Platt (F), 81a  
 central: Ziegler, 12  
 Centre Co.: D'Invilliers, 84; Ewing, 84  
 Chester Co.: Lesley, 91b; Doe Run-Avondale  
 region: Bliss (E F), 16  
 Clinton Co.: Chance, 80  
 Coatesville quadrangle: Bliss (E F), 14  
 Cumberland-Lebanon Valley: Stose, 17  
 Fulton Co.: Stevenson, 85  
 Huntington and Centre cos.: Lesley, 74c  
 Huntingdon Co.: Ashburner, 77, 78  
 Juniata district: Dewees, 78; D'Invilliers, 91  
 Lehigh and Northampton cos.: Peck, 08  
 Lehigh Co.: Lesley, 83a; Prime, 75, 78, 78a  
 Lehigh district: Miller (B L), 11b; Peck, 11  
 Lehigh Valley: Wherry, 09b  
 Lycoming Co.: Sherwood, 80  
 Medina: Grabau, 09e  
 Mercersburg-Chambersburg district: Stose, 09  
 Northampton Co.: Lesley, 83a  
 Peach Bottom slates: Frazer, 80b  
 Perry Co.: Claypole, 85  
 Philadelphia district: Bascom, 04, 09a  
 Piedmont district: Bascom, 05  
 Piedmont formations: Mathews, 05  
 southeastern: Frazer, 82  
 southern: Stose, 08  
 South Mountain: Eaton (H N), 12; Stose, 06  
 York: Frazer, 75d, 86a  
 Quebec: Ami, 91; Billings, 63a; Dawson (J W),  
 79f; Ells, 95a, 98a; Foerste, 16; Logan, 51,  
 52b, 55a; Marcou, 61c, 89; Raymond, 12d;  
 Selwyn, 79b; Valiquette, 12; Walcott, 90f  
 Anticosti Island: Laflamme, 02; Richardson  
 (J), 57; Schmidt, 04; Schuchert, 10d;  
 Twenhofel, 14  
 Aylmer, Chazy formation: Sowter, 88



## Ordovician—Continued.

Quebec: Chibougamau region: Barlow, 11a  
 Coleraine area: Knox, 18  
 eastern townships: Ells, 87a, 88  
 Gaspé Peninsula: Clarke (J M), 13d; Ells, 83a, 85; Low, 85; Richardson (J), 58, 59  
 graptolite-bearing beds: Lapworth, 87  
 Grenville sheet: Ells, 01a  
 Lake St. John district: Dresser, 16, 16b; Laflamme, 83  
 Levis: Billings, 60e; Raymond (P E), 14d  
 Lorraine: Foerste, 14a  
 Mingan and Anticosti Islands: Schuchert, 10d  
 Montmorenci: Am G, 89b; Emmons (E), 41a  
 Montreal district: Adams (F D), 04; Ami, 04a; Bigsby, 25; Ells, 96; Harvie, 10; Raymond (P E), 13c  
 Montreal-Quebec region: Logan, 54  
 Mount Yamaska: Young (G A), 06  
 Murray Bay: Dawson (J W), 61b  
 north of the St. Lawrence: Laflamme, 87  
 Orford area: Harvie, 12  
 Ottawa district: Ells, 96b, 01  
 Point Levi: Billings, 60e  
 Quebec City: Ami, 90; Bigsby, 53; Ells, 90e; Ford (S W), 87; Marcou, 88c, 91; Selwyn, 90a  
 Quebec and vicinity: Raymond (P E), 13b; Stansfield, 13  
 Richmond formations: Foerste, 13a  
 Saguenay region: Laflamme, 85  
 St. Bruno Mountain: Dresser, 10a  
 St. Francis Valley: Dresser, 06  
 St. Helen's Island: Nolan, 03  
 St. Hilaire and Rougemont mountains: O'Neill, 14  
 St. Lawrence, region south of: Richardson (J), 70  
 Simcoe district: Johnston (R A A), 11  
 southern: Dresser, 10b, 12, 13; Ells, 92a; Harvie, 14  
 Temiscouata and Rimouski cos.: Bailey (L W), 93  
 Three Rivers sheet: Ells, 00  
 Timiskaming Co.: Wilson (M E), 18  
 Trenton group: Raymond (P E), 14c  
 Ungava region: Low, 99a  
 Utica: Ami, 92d  
 Quebec group: Dawson (J W), 79f, 83f, 90g, 96; Ells, 90b; Hunt, 77a, 90a; Logan, 60a, 63a; Richardson (J), 66; Selwyn, 79a, b, 87  
 Richmond, upper, Cincinnati region: Shideler, 14  
 Richmond group, Indiana and Kentucky: Foerste, 03; Ohio and Indiana: Nickles, 03  
 Rocky Mountain region: Tomlinson, 17  
 St. Peter sandstone: James (J F), 94; Sardeson, 96a; origin: Trowbridge, 17a  
 Saskatchewan: McInnes, 13a; Malcolm, 13  
 Amisk Lake district: Bruce, 18  
 Shenandoah limestone, subdivisions: Bassler, 05b  
 Silurian-Ordovician boundary: Shideler, 16; Ulrich, 13  
 South Dakota: Darton, 09a

## Ordovician—Continued.

South Dakota: Black Hills region: Darton, 04c, 09, 09d, 18; northern: Jaggar, 04e  
 Subdivisions: Grabau, 12e  
 Taconic area: Walcott, 88  
 Taconic Range: Dana (J D), 84  
 Taconic system: Hunt, 51  
 Tennessee: Christy, 48; Currey, 54; Foerste, 01; Hall, 52d; Killebrew, 78; Safford, 56, 69, 01a  
 Briceville quadrangle: Keith, 96b  
 Bristol quadrangle: Campbell (M R), 99a  
 Chattanooga quadrangle: Hayes, 94b  
 Cleveland quadrangle: Hayes, 95a  
 Columbia quadrangle: Hayes, 03  
 Coosa Valley: McCalley, 97  
 eastern: Burchard, 13a; Safford, 59  
 Estillville quadrangle: Campbell (M R), 94  
 Greenville quadrangle: Keith, 03  
 Harpeth Ridge: Loomis, 46  
 Highland Rim: Purdue, 17b  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Loudon quadrangle: Keith, 96  
 McMinnville quadrangle: Hayes, 95c  
 Maynardville quadrangle: Keith, 01  
 middle: Safford, 51, 53, 96  
 Morristown quadrangle: Keith, 96a  
 Nashville: Jones (P M), 92  
 Perry Co.: Wade (B), 14  
 Pikeville quadrangle: Hayes, 95b  
 Roan Mountain quadrangle: Keith, 07b  
 Sewanee quadrangle: Hayes, 94c  
 southeastern: Ulrich, 13e  
 Standingstone quadrangle: Campbell (M R), 99  
 Tuckahoe district: Gordon (C H), 12a  
 Waynesboro quadrangle: Drake, 14; Miser, 17a  
 western: Pate, 08  
 Texas: Buckley, 74; Dumble, 90; Udden, 16a  
 Black and Grand prairies: Hill (R T), 01  
 Burnet Co.: Shumard, 60d  
 central: Comstock, 90  
 central mineral region: Comstock, 91  
 Chisos country: Udden, 07a  
 El Paso quadrangle: Richardson (G B), 09  
 Llano-Burnet region: Paige, 11, 12  
 trans-Pecos: Richardson (G B), 04, 08  
 trans-Pecos front range: Baker (C L), 17  
 Van Horn quadrangle: Richardson (G B), 14  
 western: Jenney, 74  
 Trenton, Kentucky: Wetherby, 80b  
 Trenton and Black River formations, New York: Coryell, 16  
 Trenton limestone: Blatchley (W S), 03b; Orton, 89  
 Tribes Hill formation, age: Raymond (P E), 10d  
 Ungava, Akpatok Island: Whiteaves, 99a  
 United States: Conrad, 42a  
 Upper Mississippi Valley: Locke, 40  
 Utah: Walcott, 08a  
 Randolph quadrangle: Richardson (G B), 13  
 San Francisco district: Butler (B S), 13  
 Uinta Mountains: Emmons (S F), 07; Powell, 76; Weeks, 07



## Ordovician—Continued.

- Utah: Wasatch Mountains: Blackwelder, 10a; Hintze, 13  
 Utica, Canada: Ami, 92d  
 Utica shale, graptolite zones: Ruedemann, 17  
 Utica slate: Walcott, 83  
 Vermont: Dana (J D), 77a; Edson, 06a; Foerste, 93b; Hitchcock (C H), 68d, 84a; Hitchcock (E), 61; Hunt, 68a; Marcou, 61c; Perry, 68a, 69; Richardson (C H), 06; Seely, 94, 06  
 Addison Co.: Seely, 10  
 Albany: Richardson (C H), 12a  
 Bennington: Gordon (C E), 14  
 Bird Mountain: Dale, 00  
 Burlington quadrangle: Perkins (G H), 10b  
 Calais, East Montpelier, and Berlin: Richardson (C H), 16  
 Central: Richardson (C H), 18  
 Champlain Valley: Van Ingen, 96  
 Chittenden Co.: Perkins, 08b  
 Craftsbury: Richardson (C H), 12  
 Fort Cassin area: Whitfield, 86  
 Franklin Co.: Perkins, 08a  
 Grand Isle: Perkins (G H), 02d, 04b  
 Green Mountains: Dana (J D), 72b, 73a; Perkins (G H), 12  
 Greensboro: Richardson (C H), 14  
 Hardwick: Richardson (C H), 14a  
 Irasburg: Richardson (C H), 12b  
 marble belt: Brainerd, 85  
 Newport, Troy, and Coventry: Richardson (C H), 08  
 northern: Hall (S R), 45  
 Orange Co.: Richardson (C H), 02  
 Rutland-Danby ridge: Dale, 94a  
 Stockbridge limestone: Dale, 92  
 Sudbury, Ordovician outlier: Dale, 12a  
 Swanton: Edson, 08  
 Taconic Mountains: Keith, 13  
 Washington limestone: Richardson (C H), 98  
 western: Dale, 99; Perkins (G H), 16  
 Woodbury: Richardson (C H), 14a  
 Virginia: Bassler, 07, 08a; Campbell (H D), 05  
 Abingdon quadrangle: Stose, 14  
 Appalachian Mountains: Campbell (J L), 79a; Darton, 92c  
 Blue Ridge: Campbell (J L), 79b  
 Bristol quadrangle: Campbell (M R), 99a  
 Buchanan Co.: Hinds, 18  
 Buckingham Co.: Darton, 92d; Taber, 13b  
 central: Campbell (J L), 79  
 Estillville quadrangle: Campbell (M R), 94  
 James River basin: Tabers (S), 13  
 Massanutten Mountain: Spencer (A C), 97  
 Monterey quadrangle: Darton, 99  
 Montgomery and Pulaski cos.: Campbell (M R), 94a  
 northeastern: Watson, 11e  
 Piedmont Plateau: Bassler, 18a, b  
 Quantico slate belt: Watson, 10b  
 Roanoke Co.: Powell (S L), 15  
 Shenandoah limestone: Bassler, 05b  
 southwestern: Powell (S L), 14; Stevenson, 81c, d, 85a, 87  
 Staunton quadrangle: Darton, 94e  
 Tazewell quadrangle: Campbell (M R), 97

## Ordovician—Continued.

- Virginia: Virgilina district: Laney, 17  
 western: Bassler, 09  
 Washington, Skykomish basin: Smith (W S), 16  
 Washington limestone, Vt.: Richardson (C H), 98  
 West Virginia: Grimsley, 06  
 Franklin quadrangle: Darton, 96c  
 Harpers Ferry quadrangle: Keith, 94  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Wisconsin: Bain, 06; Berkey, 06; Buckley, 98; Chamberlin (T C), 83; Hall, 62j; Irving, 80b; Sardeson, 01c; Shumard (B F), 52; Weidman, 15  
 Beloit region: Swezey, 82  
 central: Irving, 77  
 Chippewa land district: Owen (D D), 48  
 eastern: Chamberlin (T C), 77a  
 Galena series: Sardeson, 07  
 Lancaster quadrangle: Grant (U S), 07  
 lead region: Conrad, 43b  
 Milwaukee quadrangle: Alden, 06  
 Mississippi region: Strong, 82  
 north central: Weidman, 07a  
 St. Croix region: Wooster, 78, 82  
 south central: Irving, 75  
 southeastern: Alden, 18; Lapham, 51a  
 southwestern: Grant (U S), 03; Percival, 55, 56; Strong, 77; Whitney, 62  
 Wyoming: Darton, 06b, 08  
 Absaroka quadrangle: Hague, 99b  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Big Horn Basin: Fisher (C A), 06  
 Big Horn dolomite: Blackwelder, 13b  
 Big Horn Mountains: Darton, 04c, 06e  
 Black Hills region: Darton, 09  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Owl Creek Mountains: Darton, 06  
 Sundance quadrangle: Darton, 05a  
 western: Blackwelder, 18b; Schultz, 18  
 Ore deposits, origin. *For ore deposits in general, see Economic geology (general).*  
 Alabama, Clinton ore: Burchard, 08  
 Alaska: Brooks, 11a  
 Nizina district: Moffit, 11a  
 Prince of Wales Island: Thomae, 02  
 Treadwell deposits: Spencer (A C), 05  
 Alunite associated with gold: Ransome, 07a  
 Anhydrite as a gangue mineral: Lindgren, 10b  
 Apatite deposits, Canada: McNairn, 10; Ottawa district, Que.: Kinahan (G A), 85  
 Arizona, Clifton-Morenci district: Reber, 16  
 Cochise mining district: Kellogg, 06  
 Globe district: Ransome, 03  
 Washington Camp: Crosby, 05b  
 Artificial vein formation, Telluride, Colo.: Kemp, 13b  
 Asbestos: Hopkins (O B), 14; Richardson, (C H), 10; Black Lake-Thetford area, Que.: Graham, 17



**Ore deposits, origin—Continued.**

Ascending secondary enrichment: Turner, 14  
 Asphalt, Utah and Colorado: Stone (G H), 91  
 Association of igneous intrusions with Idaho ore bodies: Bell (R N), 08  
 Association of magnetite with sulphides in mineral deposits: Hastings, 08c  
 Association of ores and country rock: Surr, 09b  
 Bacterial origin of some mineral deposits: Breger, 11  
 Barite, Missouri, Washington Co.: Steel, 10; Nova Scotia: Warren (C H), 11  
 Bauxite deposits: Hayes, 95d, g; Arkansas: Hayes, 01a; Mead, 15; Georgia: Watson, 01c, 04  
 Black Hills, northern, S. Dak.: Irving, 04  
 Block faulting and ore deposition: Jenney, 06b  
 Bonanzas, formation: Rickard, 01b  
 Bornite as silver precipitant: Palmer (C), 15  
 Boulder batholith, origin: Knopf, 14c  
 Breccia: Wallace (J P), 00  
 British Columbia, Beaverdell area: Reinecke, 15  
   Hedley district: Camsell, 10a  
   Quadra Island: Cairnes, 14e  
   Rossland: Bruce, 17a; Drysdale, 15a  
   Telkwa district: Dolmage, 18  
   Tulameen district: Camsell, 11a  
 Brown iron ores as cavity fillings: Eckel, 13a  
 California, Engels: Tolman, 17  
   Mojave district: Bateson, 06  
   San Bernardino Co., Daggett: Storms, 92  
   Sulphur Bank: Le Conte, 82a  
 Trinity Co.: Hershey, 99  
 Carnotite deposits: Kennan, 15; Notestein, 18; Colorado: Hillebrand, 05; and Utah: Hess, 14a  
 Cave ores: Lakes, 09b  
 Cerargyritic ores: Keyes, 07a  
 Chalcocite, origin: MacCallum, 13  
 Chalcocite enrichment: Spencer (A C), 13a  
 Chemistry of ore deposition: Jenney, 03a  
 Chrome ore deposits: Harder, 10a  
 Classification of ore deposits: Kemp, 92b; Keyes, 00d, 01g; Raymond, 85; Weed, 03e, 12b  
 Coal associated with silver, Ouray Co., Colo.: Hallowell, 82b; Koenig, 81a  
 Cobalt ores: Hixon, 07; Tyrrell, 07a; Cobalt district, Ont.: Hore, 08, 11; Van Hise, 07  
 Cobalt-silver deposits of northern Ontario: Hore, 08  
 Colemanite deposits, California: Gale, 13  
 Colloidal gold and silver: Bastin, 15  
 Colloidal migration: Clark (J D), 15, 16  
 Colorado, Aspen ore deposits: Emmons (S F), 88c; Loughlin, 09; Spurr, 09a  
   Boulder Co.: Bagg, 03; Providence district: Van Diest, 95a  
   Central City quadrangle: Bastin, 17  
   Cripple Creek district: Colburn, 13a; Lindgren, 04d  
   Custer Co.: Emmons (S F), 96a  
   Downtown district of Leadville: Emmons (S F), 07a  
   Georgetown quadrangle: Spurr, 08

**Ore deposits, origin—Continued.**

Colorado: Gilpin Co.: Bastin, 15a, b, 16; Beckre (C M), 14a  
   Leadville district: Argall, 10; Boehmer, 10; Butler (G M), 12b; Emmons (S F), 82, 86, 87, 07a; Raymond, 88; Ricketts, 83; Rose, 13; Webb, 11; Iron Hill: Blow, 90  
   Monarch district: Crawford (R D), 10, 13  
   Red Cliff region: Means, 15  
   Red Mountain district: Comstock, 89  
   Rico Mountains: Ransome, 01  
   Rico quadrangle: Cross, 05a  
   Silverton quadrangle: Ransome, 01a, 05  
   Telluride quadrangle: Cross, 99; Purington, 98  
   Wagon Wheel Gap: Emmons (W H), 13e  
 Composition of waters in mines of sulphide ores: Hodge (E T), 15  
 Concentration of ores: Villarello, 05; natural: Lane, 97  
 Concentration through surface decomposition: Keyes, 01c  
 Conglomerates, metal-bearing: Storms, 99f  
 Contact deposits: Kemp, 07, 11a; Lindgren, 02a; Prescott, 15a; Stewart (C A), 10; Weed, 02f, 03e  
 Contact zones: Kemp, 13c  
 Copper: Bacorn, 14; Chapman, 57c; Fernekes, 07; Kemp, 05; Lane, 04c, 07a, 08d; Lindgren, 11b; Tolman, 14  
 Alaska: Wright (C W), 15; White River region: Knopf, 10  
 Alaska and Arizona: Tolman, 16a  
 Arizona, Ajo district: Joralemon, 14  
   Bisbee: Goodwin, 02; Notman, 13; Ransome, 04, 04b  
   Clifton quadrangle: Lindgren, 05  
   Clifton-Morenci district: Lindgren, 05a, e  
   Copper Basin: Blake (W P), 89  
   Globe quadrangle: Ransome, 04a  
   Grand Gulch region: Hill (J M), 14b  
   Miami district: Weed, 12a  
   Silverbell district: Stewart (C A), 12  
   Superior: Ransome, 14  
   Warren district: Bonillas, 16  
 Ashe Co., N. C.: Hunt, 74h  
 British Columbia: Weed, 08; Boundary district: LeRoy, 12; Rossland: Drysdale, 15a  
 California, Bully Hill district: Boyle, 14  
   Engels: Graton, 17, 18  
   Plumas Co.: Turner, 14  
   Shasta Co.: Forstner, 08a; Graton, 10  
 Cananea, Mex.: Austin, 03; Hill (R T), 03a, b; Steel, 03; Weed, 03j  
 chalcocite occurrence: Graton, 15  
 Colorado: Lindgren, 08c; Evergreen mine: Bastin, 11c; Ritter, 08  
 disseminated replacement deposits: Botsford, 13; Clifford, 13  
 Encampment district, Wyo.: Spencer (A C), 04  
 enrichment: Day (A L), 15, 15a; Santa Rita district: Bagg, 04; sulphide ores: Clark (J D), 14



## Ore deposits, origin—Continued.

- Copper: garnet contact deposits, depths at which formed: Keyes, 09d  
 Idaho, Coeur d'Alene: Huston, 15; Ray, 15  
 in "red beds" of Oklahoma: Fath, 15  
 Keweenaw Point: Smyth (H L), 96  
 Keweenaw series: Lane, 11a  
 Lake Superior region: Fernekes, 07a; Hore, 15; Jackson, 46a, 49b, 59e; Lane, 07b, 09a; Pumpelly, 71, 78; Van Hise, 11; Wadsworth, 96, 98a  
 Mackay, Idaho: Umpleby, 14b  
 Maryland, Frederick Co.: Butler (B S), 14  
 Mexico, Tamaulipas, San Jose district: Kemp, 05  
 Montana, Butte district: Bard, 13; Lawson, 14a; Sales, 13; Thompson (A P), 15; Weed, 12; Winchell (H V), 03  
 native copper: Blandy, 00; Hollister, 83; Lane, 11  
 Nevada, Ely: Whitman, 14; Robinson district: Lindgren, 07a; Yerington: Jennings, 07; Knopf, 18a  
 Newark series: Wherry, 08a  
 New England: Emmons (W H), 09  
 New Jersey: Lewis (J V), 07a  
 New Mexico: Turner, 16; Burro Mountains: Somers, 15  
 North Carolina, Gold Hill district: Laney, 10; Virgilina district: Laney, 17  
 Oklahoma: Tarr (W A), 10  
 Ontario, Lake Superior region: Dawson (J W), 57; Sudbury: Collins (J H), 88  
 ores in sandstone and shale: Lindgren, 11a  
 Oriente, Cuba: Emerson (E H), 18  
 Pennsylvania, Franklin and Adams cos.: Wherry, 11; South Mountain region: Bevier, 14; Stose, 10  
 porphyry deposits: Tovote, 12a  
 precipitation by natural silicates: Sullivan, 05  
 red beds type: Rogers (A F), 16a  
 relation of sulphides: Thompson (A P), 14  
 Sangre de Cristo Range: Bagg, 08a  
 Santo Domingo, San Cristobal: Donnelly, 15  
 secondary enrichment: Kemp, 05b  
 Sudbury, Ont.: Hore, 13g; Roberts (H M), 18  
 sulphide enrichment: Allen (E T), 16a; reactions: Zies, 16  
 sulphide ores: Day (A L), 16; Posnjak, 15; microscopic study: Graton, 13b  
 Tennessee, Ducktown deposits: Emmons (W H), 11; eastern: Whitney, 55a  
 Tooele Co., Utah: Kemp, 18b  
 Utah, Bingham Canyon: Atwood, 16; Beeson, 15; Boutwell, 05e; Zalinski, 08b  
 Velardeña district: Spurr, 08c  
 Virginia: Weed, 06a; James River basin: Taber (S), 13; Virgilina district: Laney, 11, 17  
 Copper, silver, and gold, experiments on solution, transportation, and deposition: Stokes (H N), 06  
 Copper-iron sulphides, secondary enrichment: Read, 06; Sullivan, 07

## Ore deposits, origin—Continued.

- Copper-sulphide enrichment in calcite gangues, absence of: Bard, 10  
 Country rock, influence on veins: Weed, 02a  
 Cross-fractures and ore shoots: Webber, 12  
 Cross-vein ore shoots: Weed, 03i  
 Crystallographic intergrowths: Segall, 15  
 Deposition: Newberry, 84; by meteoric waters: Lawson, 14b; by underground water: Maclaren, 02; principles controlling: Van Hise, 02  
 Depth, influence: Kemp, 13e  
 Depth of enrichment: Emmons (W H), 13a  
 Depth of ore deposits: Kemp, 13e  
 Differentiation of magmas and ore formation: Stevens (B), 04  
 Diffusion as a factor in ore deposition: De Kaib, 08; Knox, 08; Wright (L T), 08  
 Diffusion of ore deposits: Lawson, 14c  
 Dilation fissures: Weed, 04f  
 Distribution of metals and minerals in ore shoots: Surr, 09a  
 Electric activity in ore deposits: Wells (R C), 14  
 Electrochemical activity between solutions and ores: Wells (R C), 13  
 Electro-chemical agency: Chapman, 57c  
 Enrichment: Brokaw, 13; Emmons (S F), 01; Emmons (W H), 17; Graton, 13; Keyes, 01i; Palmer (C), 13a; Probert, 03; Purington, 03b; Weed, 01c, 03f  
 arid regions: Starbird, 03  
 Clifton-Morenci district: Burgess, 03  
 Coeur d'Alene district, Idaho: Shannon, 13  
 Cripple Creek, Colo.: Weed, 03h  
 in fissure veins: Hill (R T), 05b; Spurr, 05g  
 in regions of small erosion: Herrick, 03  
 in silver: Bastin, 13a  
 in veins: Church, 05  
 Santa Rita district: Bagg, 04  
 secondary: Weed, 00b  
 Examination of prospects: Gunther, 12  
 Exodus of ore deposits: Bancroft (G J), 13  
 Faulting and richness of ore: McLennan, 17; Soper, 17, 17b; Storms, 17a  
 Field work needed in study of: Coleman, 07e  
 Filtration through a mineral filter: Sullivan, 08  
 Fissure deposits: Atwood, 95  
 Fissure veins, origin: Emmons (S F), 88a  
 Fissures, formation of: Brown (A J), 74  
 Fluorine in sericitization: Paige, 18  
 Fluorspar, western Kentucky: Fohs, 10; Ulrich, 05  
 Formation and enrichment of ore-bearing veins: Bancroft (G J), 07  
 Formation in depth: Fermor, 14  
 Fractional precipitation of ore-forming compounds: Wells, 15; of sulphides: Wells (R C), 10  
 Garnet, New York: Miller (W J), 12, 13a  
 Garnet zones: Kemp, 12d; origin: Lindgren, 14c  
 Gel ores: Krusch, 13  
 Gels, gelatinous quartz, and gold-ore deposition: Hatschek, 12



**Ore deposits, origin—Continued.**

**General:** Adams (F D), 02a; Alderson, 01; Anda, 77a; Bacorn, 14; Bain, 02; Bancroft (G J), 07, 07a, 11; Beck, 02, 05; Boehmer, 04; Boyd, 18; Brown (A J), 74; Campbell (A C), 80; Clarke (F W), 08; Coleman, 07e; Collins, 02, 13; Cotta, 54; Daly (R A), 15b; Emmons (S F), 87, 87b, 88, 02a; Emmons (W H), 13e, 18; Finch (J W), 04; Hancock, 10; Hastings, 18; Hatch, 14; Hills, 89b; Hixon, 07a; Hunt, 75; Jenney, 94; Keck, 83; Kemp, 91c, 93, 96a, 02a, 03a, 06, 07; Keyes, 00a, 01g, i, 02e; Lakes, 95; Launay, 02; Lawson, 14c; Le Conte, 83a; Leeds, 58; Lindgren, 02a, 06e, 07, 07c, 13; Lindsley, 14; Maclaren, 13; Merrill (F J H), 07e; Miller (G W), 07, 12a; Minor, 99; Nichols (H W), 07; Nishihara, 14; Owen (Richard), 80; Pearce, 89; Phillips (J A), 79; Pošepný, 94, 95; Raymond (R W), 70a, 01; Read, 06; Rickard, 95, 03; Rogers (A F), 15b; Rolker, 84; Rowe, 11a; Shaler, 77; Shamel, 07; Soper, 11a, 12a; Spurr, 03c, 04, 05d, 07, 12; Stewart (C P), 12a; Stokes (H M), 07; Streer, 91a; Streeruwitz, 95; Storms, 04a; Sullivan, 07, 07a; Tays, 01; Van Hise, 00a, 01b, 01c, e, 02, 04; Villarello, 07b; Vogt, 02; Wadsworth, 85a; Weed, 02a, b, 03e, 05; Whittlesey, 77; Williams (A), 84; Wilson (E B), 04; Winchell (H V), 07

**Genetic classification:** Emmons (S F), 03c, d, e; Weed, 03g, k

**Genetic diversity of contiguous ore deposits:** Keyes, 01m

**Georgia:** Jones (S P), 09

**Gold:** Calvert, 54; Don, 98; Kraatz, 96; Palmer (C), 13a; Rickard, 95; Spurr, 03c; Voyle, 03; Wurtz, 94

**Alaska:** Knopf, 12; Spencer (A C), 06a

**Berners Bay region:** Knopf, 11

**Douglas Island:** Spencer (A C), 05b; Treadwell mine: Adams (F D), 89; Dawson (G M), 89c; Hershey, 11

**Yukon district:** Spurr, 98a

**association with alunite in Goldfield district:** Lincoln, 07a; Ransome, 07a

**British Columbia, Barkerville:** Atkin, 04

**California:** Laur, 61, 63; Lindgren, 95b; Phillips (J A), 68; Simonin, 60

**Feather River region:** McLennan, 16

**Klamath Mountains:** Ferguson (H G), 15  
**northern:** Hershey, 10

**quartz veins:** Lindgren, 96d

**Siskiyou Co., King Solomon mine:** Hershey, 01e

**Canadian pre-Cambrian deposits:** Wallace (R C), 18

**central slate belt, North and South Carolina:** Nitze, 97d

**Colorado, Ouray:** Endlich, 89

**concentration in Klondike:** Tyrrell, 07

**Cripple Creek district, Colo.:** Penrose, 95

**deposition:** Bradford, 04; Lenher, 14, 18

**enrichment:** Mann, 14

**fine, Snake River, Idaho:** Bell (R N), 02

**Gaston Co., N. C.:** Lieber, 58

**Georgia:** Jackson, 59c

**Ore deposits, origin—Continued.**

**Gold:** Georgetown district, Mont.: Billingsley, 13

**Goldfield, Nev.:** Barnes, 13; Ransome, 09

**Manitoba, Wekusko Lake:** Alcock, 18a

**Mercur district, Utah:** Spurr, 95

**National district, Nev.:** Lindgren, 15; Winchell (A N), 12a

**Nevada City and Grass Valley, Cal.:** Lindgren, 96b

**Nova Scotia:** Faribault, 13; Hind, 70b; Rickard, 12

**Cape Breton:** Woodman, 99

**Halifax Co., Moose River district:** Woodman, 05

**Waverley district:** Wilson (B C), 94

**Ontario, Algoma:** Crosby, 02a

**Kirkland district:** Spearman, 14

**Michipicoten district:** Means, 14

**Porcupine district:** Hore, 12f, 13a, f, h

**Timiskaming district:** Burrows (A G), 14  
**western:** Hille, 97

**origin in quartz veins:** Lobley, 94

**Rawhide, Nev.:** Whytock, 10

**Saskatchewan, Amisk Lake district:** Bruce, 18

**South Carolina:** Lieber, 59, 59a

**telluride ores:** Kemp, 98b

**transfer by mineral waters:** Emmons (W H), 10c

**Virginia, James River basin:** Taber (S), 13

**Washington, Blewett district:** Weaver, 11;

**Republic district:** Umpleby, 10

**Gold-bearing fissure veins:** Lindgren, 97c

**Gold-bearing ores, paragenesis:** Pearce, 90a

**Graphics of ore origin:** Keyes, 11g

**Graphite:** Stansfield, 13a

**Montana, Dillon district:** Winchell (A N), 11a, b

**New York, near Ticonderoga:** Bastin, 10a

**Pennsylvania:** Miller (B L), 12a

**Quebec:** Hille, 08; Buckingham: Wilson (M E), 17b

**Ground-water:** Kemp, 13a

**Gypsum deposits:** Jennison, 11

**Halogen salts of silver:** Burgess, 18

**Hematite, zonal growth:** Sosman, 17

**Hodson, Cal.:** Forstner, 04

**Horses:** Wallace (J P), 00

**Hot springs at Ojo Caliente and their deposits:** Lindgren, 10a

**Hydrothermal alteration:** Stephenson (E A), 16

**Uglow, 13b; of granite:** Moore (E S), 14c

**Idaho, Coeur d'Alene:** Hershey, 16; **Success zinc-lead deposit:** Hershey, 17

**Mackay region:** Umpleby, 17

**Mineral:** Turner, 08a

**western central:** Lindgren, 00a

**Igneous ores:** Gregory (J W), 08

**Igneous origin:** Adams (F D), 94b

**Igneous rocks, relation to ore deposits:** Lakes, 05f; Spurr, 03c

**and circulating waters:** Kemp, 03a

**Illinois:** Cox (G H), 10

**lead and zinc:** Trowbridge, 16; Bain, 05a

**Indicator veins:** Storms, 99i

**Interaction on minerals and water solutions:** Sullivan, 07a



**Ore deposits, origin—Continued.**

**Intergrowth of bornite and chalcocite:** Rogers (A F), 16b  
**Intergrowths of minerals:** Goodchild, 16  
**Iron:** Grimsley, 09; Hunt, 80f; Julien, 83; Lesley, 59; Newberry, 80b; Safford, 89a; Sosman, 17a; Winchell (H V), 92  
**Alabama, Lookout Mountain, Clinton ores:** Bowron, 05  
**Animikie range:** Hille, 04; Silver, 06  
**Appalachian ores:** Earle, 13; Prime, 75a  
**Atikokan ores:** Hille, 08a  
**Belcher Islands, Hudson Bay:** Moore (E S), 18  
**bog ores:** Dake, 15a; English River, Ont.: Moore (E S), 09a; Thunder Bay district, Ont.: Moore (E S), 10a  
**bombshell ore:** Chance, 08d  
**California, San Bernardino Co.:** Harder, 10c; Shasta Co.: Prescott, 08a  
**Clinton ore:** Smyth (C H), 92a, 94d, 11a; McCallie, 08a  
**Alabama:** Burchard, 08b, 10c  
**New York:** Newland, 08a, 09  
**Pennsylvania:** Kelly, 09; Rutledge, 08  
**Colorado, Caribou:** Bastin, 14b  
**Grayback district:** Patton, 10a  
**Leadville:** Argall, 14a  
**Cornwall type of Pennsylvania:** Spencer (A C), 08a  
**Cuba:** Leith, 11b  
**Camaguey and Moa ores:** Cumings (W L), 11  
**Camaguey and Oriente ores:** Spencer (A C), 11  
**Daiquiri district:** Kemp, 15a; Lindgren, 15b; Singewald, 16  
**eastern:** Leith, 15c  
**Firmeza district:** Roesler, 16; Singewald, 16  
**Mayari and Moa deposits:** Hayes, 11a  
**Moa district:** Cox (J S), 11  
**Santiago:** Kimball, 84b  
**ferriferous deposits of Mississippi Valley:** McGee, 80  
**genesis:** Kimball, 91  
**Georgia:** McCallie, 00; Ellijay: Phalen, 08  
**hematite ores:** Catlett, 08a; Chance, 08e  
**Iowa, Waukon:** Howell (J V), 16  
**Iron Mountain, Mich.:** Browne (D H), 89  
**Kentucky, northeastern:** Phalen, 06  
**Keewatin, Minn.:** Winchell (N H), 89f  
**Lake Superior region:** Irving, 86, 90; Leith, 05a, b, 11; Spurr, 02; Van Hise, 01, 11; Whitney, 56; Winchell (H V), 98; Winchell (N H), 12a  
**limonite:** Bowles, 11a; Dana (J D), 84d  
**Appalachians:** Garrison, 04  
**Mayaguez, Porto Rico:** Fettke, 18  
**Pennsylvania:** Frazer, 78; Hopkins (T C), 00c  
**magnetic ores:** Nason, 12  
**magnetite deposits near Dillsburg, Pa.:** Harder, 10g  
**Adirondacks:** Newland, 08  
**Putnam Co.:** Stewart (C A), 08  
**manganiferous ores, Minnesota, Cuyuna district:** Harder, 17a

**Ore deposits, origin—Continued.**

**Iron:** Maryland: Singewald, 11  
**Mattagami basin, Ont.:** Baker (M B), 11, 11a  
**Michigan:** Lane (A C), 09c, 10a  
**Crystal Falls district:** Clements, 99  
**Marquette district:** Van Hise, 97; Wadsworth, 80c  
**Menominee district:** Bayley, 04  
**Minnesota:** Van Barneveld, 12; Winchell (N H), 91, 92b  
**Mesabi district:** Leith, 03; Spurr, 94, 94d; Winchell (H V), 93, 93b; Winchell (N H), 92g, 08  
**Vermilion district:** Abbott (C E), 07; Clements, 03  
**Missouri:** Crane (G W), 12; Gage, 73; Nason, 92  
**Nevada, Barth:** Jones (J C), 13  
**New Brunswick, Bathurst district:** Young, 11a  
**Newfoundland, Wabana:** Hayes, 15, 16  
**New Jersey:** Bayley, 10a; Darton, 08b; magnetite deposits, Sussex Co.: Spencer (A C), 04b  
**New York:** Fettke, 12; Hall, 37  
**Adirondacks:** Kemp, 99b  
**Brewster district:** Koeberlin, 09  
**Elizabethtown and Port Henry quadrangles:** Kemp, 10c  
**hematite ores:** Crosby, 01a  
**Nova Scotia:** Woodman, 14  
**Ontario:** Coleman, 01a; Willmott, 08  
**Lanark Co.:** King (S), 10  
**magnetite ores:** Foye, 16a  
**Michicipoten region:** Bell (J M), 05; Coleman, 02a; Parsons (A L), 15  
**Moose Mountain range:** Leith, 03b  
**Onaman range:** Moore (E S), 09b  
**Sturgeon Lake:** Bowles, 11a  
**western:** Hille, 02  
**Woman River area:** Allen (R C), 09a  
**Oriskany limonites:** Johnson (J E), 03  
**Oriskany ores, Virginia:** Weld, 15  
**Ozark region, Mo.:** Robertson (J D), 93  
**Paleozoic interbedded deposits:** Earle, 14  
**Pennsylvania, Cornwall deposits:** Wilson (A W G), 11  
**Dillsburg brown ore:** Harder, 10e  
**southeastern:** Frazer, 82  
**York and Adams cos.:** Frazer, 75h  
**Penokee-Gogebic region:** Van Hise, 89  
**pipe ore, origin:** Leslie, 79e  
**pyritic origin:** Cabot, 08; Chance, 08b  
**residual, of Cuba:** Spencer (A C), 08, 08c; Weld, 09  
**residual concentration:** Kimball, 98  
**residual ores, formation and distribution:** Dake, 15  
**Salisbury district:** Hobbs, 07d  
**sedimentary ores:** Herdsman, 11  
**southern Appalachians:** Hayes, 97c  
**sulphides:** Allen (E T), 11  
**Tennessee:** Gordon (C H), 13a  
**Tertiary, Arkansas and Texas:** Penrose, 92a  
**Texas, eastern:** Penrose, 90  
**titanic ores:** Warren (C H), 18  
**titaniferous magnetite, Minnesota:** Broderick, 17



**Ore deposits, origin—Continued.**

Iron: titaniferous ores: St. Clair, 14a  
 Utah, Iron Co.: Jennings (E P), 05; Iron Springs district: Leith, 08a  
 Joints, influence on location of ore shoots: Bond, 13  
 Joplin deposits: Bain, 01a, 02; Siebenthal, 14  
 Kaolinization: Becker, 82  
 Laccolith in ore deposition: Keyes, 11c  
 Laccoliths and ore deposits: Storms, 99j  
 Lateral secretion theory: Van Diest, 95a; Wadsworth, 84g  
 Lateritic ore deposits: Miller (W G), 17a  
 Lead, Arkansas: Branner, 02b  
 British Columbia, East Kootenay: Schofield, 12a  
 Cherokee Co., Kans.: Haworth, 84  
 Coeur d'Alene district, Idaho: Hershey, 13; Ransome, 08  
 Dubuque, Iowa: Calvin, 00  
 Galena-Joplin district: Haworth, 00b  
 Illinois: Cox (G H), 10; Galena and Elizabeth quadrangles: Shaw (E W), 16; northwestern: Cox (G H), 14  
 Iowa: Leonard, 97  
 Joplin district: Bain, 01a; Siebenthal, 15  
 Kentucky: Shaler, 77; Henry Co.: Norwood, 77a  
 Metaline district, Wash.: Bancroft (H), 11a  
 Mississippi Valley: Jackson, 63a; Keyes, 02d; Winslow, 93  
 Missouri: Winslow, 94; southeastern: Buckley, 09; Wheeler, 04; southwestern: Schmidt, 75  
 Ontario: Lewis (J V), 06  
 Ontario and Quebec: Uglow, 16a  
 ores in sandstone and shale: Lindgren, 11a  
 Ozark region: Buckley, 11a  
 Rossie, St. Lawrence Co., N. Y.: Smyth (C H), 03  
 upper Mississippi Valley: Cox (G H), 11  
 Wardner district, Idaho: Ransome, 12  
 Wisconsin district: Bain, 11c; Chamberlin (T C), 82c; Daniels, 54; Whitney, 62  
 Lead and zinc ores, Galena-Joplin district: Clerc, 07; Haworth, 04  
 Iowa: Leonard, 95  
 Joplin district: Ruhl, 08a  
 Mississippi Valley: Bain, 06, 07; Buckley, 07; Spurr, 15  
 Missouri: Buckley, 08; Tarr (W A), 18c  
 Ontario: Uglow, 16  
 Ozark region: Bain, 01; Buckley, 09a; Buehler, 17; Keyes, 01m, 09c  
 Virginia-Tennessee region: Watson, 06a  
 Wisconsin: Grant (U S), 06b  
 Lead-silver deposits, Idaho: Ransome, 08  
 Literature on ore deposits: Kemp, 88; Ransome, 11e  
 Localization of ore: Keyes, 12d; Cripple Creek district, Colo.: Rickard, 02  
 Localization of values: Grout, 16  
 Locus of vadose ore deposition: Keyes, 09g  
 Lodes, veins, and beds, irregularities: Kohler, 87  
 Magmatic differentiation and ore formation: Kemp, 03f; Pope, 11

**Ore deposits, origin—Continued.**

Magmatic origin, ore solutions: Tolman, 12; of vein-forming waters in southeastern Alaska: Spencer (A C), 05c  
 Magmatic segregation of ores: Singewald, 17b; Spurr, 03c; Stevens (B), 04a  
 Magmatic sulphide ores: Tolman, 16, 17b  
 Magmatic waters and volcanic action: Hixon, 08c  
 Magnesite, Valley, Washington: Jenkins, 18a  
 Magnetite deposits, Adirondack region: Newland, 07  
 British Columbia: Kimball, 97a  
 genesis: Kimball, 97b  
 Pennsylvania, Berks and Lebanon cos.: Spencer (A C), 07  
 Manganese ores: Penrose, 91; West, 09a  
 agency in gold deposits: Emmons (W H), 10b; Keyes, 11e  
 Arkansas, northern: Penrose, 91b  
 Georgia: Watson, 08, 09a  
 in superficial alteration: Eddingfield, 13  
 Mineral Hill, Ariz.: Blauvelt, 89  
 Nevada, Golconda: Penrose, 93  
 New Brunswick, Quaco: Whittle, 91  
 Newfoundland: Dale (N C), 15  
 Virginia: Hewett, 16, 18  
 Manganese oxides: Dunnington, 88  
 Mechanics of vein formation: Taber (S), 18a  
 Metalliferous deposits: Hunt, 73c  
 Metalliferous veins: Kemp, 05c  
 Metallogenetic epochs: Lindgren, 09c; pre-Cambrian, Ontario: Miller (W G), 15a  
 Metamorphic processes: Van Hise, 04  
 Metamorphosed ore deposits: Emmons (W H), 09  
 Metasomatic processes in fissure veins: Lindgren, 01a  
 Metasomatism, Idaho: Lindgren, 00a; in downward sulphide enrichment: Bastin, 13  
 Meteoritic agglomeration: Keyes, 10l  
 Mexico: Villarello, 08a, 10a  
 Cananea: Hill (R T), 03b  
 Chihuahua, Santa Eulalia district: Prescott, 15  
 Matehuala, Dolores contact-metamorphic ore deposit: Spurr, 12a  
 Sierra Mojada district: Van Horn (F R), 12  
 Sonora: Merrill (F J H), 08b  
 Velardeña district: Spurr, 08a  
 Zimapán (Hidalgo): Lindgren, 14b  
 Mine examination: Butler (G M), 09  
 Mine waters and hot springs: Emmons (W H), 13c  
 Mineral belts, Pacific slope: Becker, 84a  
 Mineral crest: Jenney, 03  
 Mineral sulphides of iron: Allen (E T), 12a  
 Mineral veins: Newberry, 84; formation: Everette, 08a; Fox, 38  
 Mineralizing solutions, intrusive pressure: Stevens (B), 14a  
 Mine-water composition: Lane, 14  
 Minute quantities of metalliferous minerals in rocks: Keyes, 08e  
 Missouri: Meyer (F C), 91  
 Modern ancient volcanoes and ore deposits, Lakes, 09a



## Ore deposits, origin—Continued.

- Modes of occurrence of gold-bearing quartz: Rickard, 95  
 Molybdenite, Arizona: Schrader, 10a; Pontiac Co., Que.: Thomson, 18  
 Monazite deposits: Derby, 00; Sterrett, 08a  
 Montana, Boulder batholith: Billingsley, 15, 17  
   Boulder Hot Springs: Weed, 00a, c  
   Butte district: Atwood, 16  
   Elkhorn district, Jefferson Co.: Weed, 01;  
     magmatic sulphide ore body: Knopf, 12c, 13b  
   Garnet Range: Pardee, 18  
   Georgetown, Southern Cross mine: Billingsley, 13  
   Little Belt Mountains: Weed, 00  
   Philipsburg quadrangle: Calkins, 15  
 Natural solutions of cinnabar, gold, and associated sulphides: Becker, 87b  
 Nevada, Bullfrog district: Ransome, 10c  
   Clark Co.: Yellow Pine district: Hale (F A), 18  
   Comstock lode: Becker, 82; Reid (J A), 05  
   Comstock vein systems: Smith (D T), 12  
   Eureka district: Curtis, 84; Hague, 92; Raymond, 79  
   Fairview district: Greenan, 14  
   Goldfield district: Ransome, 10a  
   Klondike district: Spurr, 06a  
   ore shoots: Chase (E E), 09  
   Silver Peak quadrangle: Spurr, 06b  
   Steamboat Springs: Le Conte, 83  
   Tonopah deposits: Bastin, 18; Eakle, 12; Spurr, 03a, b, 05, 15a  
   Wedekind, hydrothermal activity: Morris (H G), 03  
   western: Spurr, 05d  
 Newer theories of ore deposition: Kemp, 14  
 New Mexico: Lindgren, 10  
   Pinos Altos district: Wade (W R), 14a  
   Silver City quadrangle: Paige, 16  
 Nickel: Charleton, 94; Packard (R L), 94b  
   Ontario, Sudbury district: Bateman, 17; Browne, 06; Coleman, 03, 05, 07d, 08, 13, 15c, 16b, 17a; Corless, 17; Dickson, 04; Dresser (M A), 17; Goodchild, 18; Gregory (J W), 08b; Hore, 13g; Howe, 14; Roberts (H M), 18; St. Clair, 14; Tolman, 17a; Timiskaming district: Baker (M B), 17  
   Pennsylvania, Lancaster Gap: Kemp, 95c  
 Nickel and copper, Sudbury, Ont.: Barlow, 04; Browne (D H), 95, 06; Coleman, 07d; Corless, 16; Hixon, 09a; Roberts (H M), 18; Anon, 16a  
 Nickeliferous pyrrhotites, microstructure: Campbell (W), 06c, 07  
 Nitrate salts: Gale, 12  
 North Carolina, Cid mining district: Pogue, 10  
 Ocher deposits: Miller (B L), 11b; Watson, 06; Pennsylvania: Stoddard, 10  
 Ontario, Cobalt area: Miller (W G), 11a  
   Long Lakemine: Uglow, 16b  
   Porcupine district: Shaw (S F), 11  
   Port Arthur, Porcupine lode: Kirkland, 89  
 Ontario deposits, classification: Miller (W G), 15

## Ore deposits, origin—Continued.

- Ore deposition, chart: Keyes, 12c  
   from igneous magmas: Kemp, 04c; Stevenson (R), 03  
   relation to faulting: Spurr, 16  
   theories: Emmons (S F), 04a, 09a; Hixon, 08; Jaggar, 08a; Pryor, 08; Ransome, 08d; Spurr, 07; Winchell (H V), 07, 08a  
 Ore deposits: Emmons (S F), 13  
   and inclosing walls: Fairbanks, 93e; Lindgren, 93c  
   and intrusive bodies in Utah: Butler (B S), 15b  
   and receptacle-making processes: Miller (G W), 11a  
   and underground water circulation: Miller (G W), 11  
   in limestone, forms: Henrich, 88  
   in sedimentary formations: Pirsson, 15b  
   in serpentine: Forstner, 07a  
   origin and classification: Newberry, 80a  
   persistence in depth: Collins (G E), 12; Garrison, 12; Lett, 12; MacLaren, 12, 13; Rickard, 12a, 14, 16; Storms, 13; Tolman, 12b; Winchell (H V), 13  
   present tendencies in the study of: Lindgren, 07c  
   surface appearance: Bancroft (G J), 11a  
 Ore formation, Sulphur Bank, Cal.: Le Conte, 82a  
 Ore localization in Ozark region: Keyes, 10c  
 Ore on limestone side of garnet zones: Umpleby, 16  
 Ore segregation: Tolman, 16  
 Ore shoots: Garrison, 12; Grout, 16; Lindgren, 09  
   causes: Penrose, 10  
   cross-vein: Weed, 03i  
   decrease of value with depth: Garrison, 11; Hore, 12  
   genesis: Kirby, 98a  
   magmatic differentiation, relation to: Pope, 11  
 Ores formed by magmatic segregation: Garrison, 09  
 Ores in volcanic craters and fumarole orifices: Lakes, 09  
 Oregon, southwestern: Winchell (A N), 14a; Sumpter quadrangle: Pardee, 14  
 Organic origin of mineral deposits in unaltered Paleozoic sediments: Van Ingen, 15  
 Organic remains in ore deposits: Lakes, 05e  
 Original source of metalliferous ores: Miller (G W), 12  
 Osmosis in ore formation: Gillette, 04  
 Outcrop of ore bodies: Emmons (W H), 09a  
 Oxidation of manganese solutions: Lenher, 16; of sulphides: Buehler, 10  
 Ozark lead-zinc deposits: Keyes, 09c  
 Ozark uplift and ore deposits: Haworth, 00  
 Panama: Hershey, 99b  
 Phosphate: Gale, 10b; Smith (E A), 92b  
   Florida: Johnson (L C), 93  
   South Carolina: Reese, 92; Rogers (G S), 14a  
   Tennessee: Hayes, 96a, 03j; Phalen, 16a  
 Physiographic changes and ore alterations: Atwood, 15a



**Ore deposits, origin—Continued.**

Placer deposits: Tyrrell, 12a  
 Pockets in gold veins: Harrison, 07  
 Precipitation of gold and silver by minerals: Palmer (C), 13  
 Pressure in formation of ore deposits: Taber (S), 18b  
 Pyrite, Leona rhyolite: Clark (C W), 17  
 New York, Peekskill district: Loveman, 11; St. Lawrence Co.: Smyth, 12  
 origin: Willmott, 07a  
 oxidation: Read, 07; Winchell (A N), 07  
 vadose synthesis: Whitman, 13  
 Virginia, Louisa Co.: Nason, 94f  
 Pyrite and marcasite, action on, by various solutions: Stokes (H N), 07  
 Pyritic gold ores: Emmons (W H), 11b  
 Pyrrhotitic deposits: Tolman, 16  
 Quartz veins, in lamphrophyre intrusions: McLennan, 15  
 of Silver Peak, Nev.: Hastings, 06  
 Quicksilver: Becker, 89  
 Arizona, Phoenix Mountains: Schrader, 18  
 California: Aubury, 03; Becker, 88; Bradley (W W), 18a; California: Christy, 79; Veatch (J A), 14  
 Mexico: Villarello, 03; Guerrero: Halse, 95  
 Terlingua district, Tex.: Hill (R T), 02e  
 Replacement: Emmons (S F), 84; nature of: Stevens (B), 13a  
 of siliceous rock by pyrite: Turner (J W), 12  
 Replacement deposits, Cripple Creek district, Colo.: Colburn, 13; Sierra Nevada: Turner, 99a  
 Replacement ore bodies: Irving, 11, 11a; Knox, 12; Stevens (B), 12  
 Rock pressure and metamorphism: Chance, 08c  
 Rock segregation and ore deposition: Stevens (B), 03a  
 Rôle of igneous rocks: Kemp, 02a  
 Salt deposits, Ojo de Liebre, Lower California, Mex.: Wittich, 16  
 West Virginia: Grimsley, 09  
 "Sandstone" ore deposits: Kennan, 15a  
 Secondary enrichment, copper-iron sulphides: Read, 06  
 Cripple Creek, Colo.: Bancroft, 02  
 Gilpin Co., Colo.: Bastin, 15b  
 gold deposits: Reed, 11  
 Secondary limestones: Fermor, 14  
 Secondary sulphide enrichment: Winchell (H V), 12  
 Secondary sulphide zones: Emmons (W H), 12  
 Segregation in ores: Browne (D H), 95  
 Sericite a low temperature hydrothermal mineral: Rogers (A F), 16  
 Shoots in metalliferous deposits: Irving, 08; Smith (F C), 08; Winchell (H V), 08  
 Silicate zones: Stewart (C A), 13b  
 Silver: Matteson, 12b; Palmer (C), 13a  
 Aspen district, Colo.: Spurr, 98, 09g  
 association with coal, Ouray Co., Colo.: Hallowell, 82b; Koenig, 81a  
 bonanza ores of arid region: Keyes, 11  
 Calico, Cal.: Lindgren, 87  
 Cobalt, Ont.: Bastin, 17a; Emmons (S F), 11; Hore, 08, 11c, d; Miller (W G), 13; Reid (J A), 18

**Ore deposits, origin—Continued.**

Silver: Cœur d'Alene district, Idaho: Hershey, 13; Ransome, 08  
 Colorado: Van Horn (F R), 08a; Monarch district: Crawford (R D), 10  
 Comstock lode: Becker, 82a  
 East Kootenay, B. C.: Schofield, 12a  
 enrichment: Cooke (H C), 13  
 enrichment experiments: Ravicz, 15  
 Guerrero, Bravos district, Mex.: Flores, 12  
 Granite-Bimetallic mine, Mont.: Emmons (W H), 08c  
 halogen salts, occurrence: Lindgren, 18  
 in galena ores: Nissen, 15  
 Lake Superior: Jackson, 59e  
 Lake Valley district, N. Mex.: Keyes, 08; MacDonald (B), 09  
 Mercur district, Utah: Spurr, 95  
 Montreal River mining district: Barlow, 08  
 Nevada, Austin: Taylor (H B), 12; Wonder: Young (J W), 18  
 Nipissing district: Hore, 11  
 ores in sandstone and shale: Lindgren, 11a  
 Utah, silver sandstone district: Rolker, 81  
 Silver enrichment: Palmer (C), 14a  
 Silver halides, occurrence: Knopf, 18e  
 Silver ores, microscopic study: Guild, 17  
 Silver pipe, central New Mexico: Keyes, 03c  
 Silver Reef district, southern Utah: Rothwell, 80  
 Silver salts, genesis: Burgess, 11  
 Silver-lead deposits, Newburyport, Mass.: Clapp (C H), 09a  
 South Dakota, Black Hills: Nicholas, 11a; northern: Irving, 99, 03  
 Specific volume of ores: Mead, 08  
 Sphalerite, relation to other sulphides in ores: Graton, 18a; Teas, 17; Watson, 18b  
 Striations, meaning: Bucke, 07  
 Structural relations: Emmons (S F), 88  
 Successive phases of mineralization: Lindgren, 12b  
 Sulphide enrichment: Emmons (W H), 13; Foote (H W), 10; Gregory (J W), 10; Grout, 13; Louis, 10a; Nishihara, 14; Ransome, 10; Rogers (A F), 14; Sales, 10a; Tolman, 13, 14, 14a, b; Wells, 10; Whitman, 13; Winchell (A N), 10b; Young (S W), 15  
 carbonates in: Nishihara, 14  
 upward, Butte, Mont.: Rogers (A F), 13c  
 Sulphide intergrowths, paragenesis: Whitehead, 16  
 Sulphide ore bodies in oxidized zones: Keyes, 11d  
 Sulphide ore enrichment, laboratory studies: Young (S W), 16  
 Sulphide ores: Coleman, 06c  
 Sulphides, relation to water level in Mexico: Lucke, 18  
 Sulphur deposits: Stutzer, 12  
 Colorado, Mineral Co.: Larsen, 13b  
 Mapimi: Villarello, 07a  
 Woolmuth quarry, Mich.: Kraus, 05c  
 Wyoming, Sunlight Basin: Hewett, 13  
 Superficial alteration: Penrose, 94; Raymond (R W), 95; of Butte veins: Sales, 10  
 Superficial appearance and alteration of ore deposits: Bancroft (G J), 11a



## Ore deposits, origin—Continued.

- Superficial diffusion: Penrose, 14  
 Syncline as a structural type: Rickard, 03e  
 Synthesis of pyrite: Whitman, 13  
 Temperatures in zones of chalcocitization  
 Emmons (W H), 15  
 Texas, Llano-Burnet region: Paige, 11  
 Theories of fifty years ago: Emmons (S F), 10b  
 Tin: Ferguson (H G), 12; Singewald, 12a  
 Alaska, Seward Peninsula: Knopf, 08b  
 Nevada, Lander Co.: Knopf, 16; wood tin:  
 Knopf, 16a  
 Tourmalinic silver-lead deposits: Knopf, 13a  
 Treatise on ore deposits: Cotta, 70  
 Tungsten deposits: Hess, 17; and surface en-  
 richment: Surr, 09  
 Colorado: George (R D), 09, 09b  
 Inyo Co., Cal.: Knopf, 17  
 Turquoise, Burro Mountains, N. Mex.: Paige,  
 12c  
 Types of ore deposits: Bain, 11b; Lawson, 12f  
 Ultimate source of metals: Stevens (B), 13;  
 of ores: Keyes, 10  
 Uranium, ores in sandstone and shale: Lind-  
 gren, 11a  
 Uranium-vanadium ores: Notestein, 18; Colo-  
 rado: Hillebrand, 00c  
 Utah: Loughlin, 16a  
 Bingham district: Boutwell, 05d,f  
 Camp Floyd district: Hills, 98  
 Ontario mineral belt: Jenney, 06-06c  
 Park City district: Boutwell, 12  
 San Francisco district: Butler (B S), 13, 14a  
 Tintic district: Crane, 15; Emmons (S F),  
 00; Lindgren, 15d; Tower, 99, 00  
 Tooele Co.: Kemp, 18b  
 Vanadium, Colorado: Hess, 13b; ores in sand-  
 stone and shale: Lindgren, 11a  
 Vein cavities, origin: Nason, 01b  
 Vein formation: Carpenter (F R), 04; Comstock,  
 92a; Edwards (W F), 04; Taber (S) 18a;  
 rôle of underground water: Daubrée, 88  
 Vein intersections, Clear Creek Co., Colo.:  
 Underhill, 97  
 Vein quartz, St. Anthony mine: Moore (E S),  
 12a  
 Vein walls: Richard, 96  
 Vein-filled openings, southeastern Alaska:  
 Spencer (A C), 05d  
 Volcanic action and ore deposition: Chase (T),  
 09a; Hixon, 09b  
 Volcanic theory: Wadsworth, 87b  
 Vulcanism and differential pressure in ore  
 deposition: Hixon, 10  
 Walls of mineral veins: Storms, 99h  
 Wardner district, Idaho: Ransome, 12  
 Washington, Index district: Weaver, 12  
 Metaline district: Bancroft (H), 11a  
 Monte Cristo district: Spurr, 01  
 Myers Creek district: Umpleby, 11  
 Skykomish basin: Smith (W S), 15  
 Water in veins: Kemp, 13d; Rickard (T A),  
 03d, 13  
 Waters, meteoric and magmatic: Kemp, 08b;  
 Rickard, 08b; Turner, 08c  
 Wisconsin, brown ores: Allen (R C), 09; lead  
 and zinc deposits: Bain, 11c

## Ore deposits, origin—Continued.

- Zinc: Boyd, 18  
 Arkansas: Branner, 00, 02b  
 California, Inyo Range: Knopf, 18  
 Cherokee Co., Kans.: Haworth, 84  
 Colorado, Leadville: Butler (G M), 13;  
 Loughlin, 18  
 Dubuque, Iowa: Calvin, 00  
 Franklin Furnace, N. J.: Kemp, 94c  
 Galena-Joplin district: Haworth, 00b  
 Idaho, Coeur d'Alene district: Hershey, 13  
 Illinois: Cox (G H), 10  
 Galena-Elizabeth quadrangles: Shaw  
 (E W), 16  
 northwestern: Cox (G H), 14  
 Iowa: Leonard, 97  
 Joplin district: Bain, 01a; Siebenthal, 15  
 Joplin-Maimi district: Buehler, 18  
 Mississippi Valley: Keyes, 02d; Winslow, 93  
 Missouri: Winslow, 94; southwestern: Cox,  
 16a; Schmidt, 75; Seamon, 90  
 New York, Edwards district: Smyth (C H),  
 18  
 oxidized ores, formation from sulphide: Wang,  
 15  
 Ozark region: Buckley, 11a  
 Tennessee, Union Co.: Nason, 15  
 upper Mississippi Valley: Cox (G H), 11  
 Utah, Tintic district: Loughlin, 14a  
 Washington, Metaline district: Bancroft (H),  
 11a  
 Wisconsin district: Bain, 11c; Chamberlin  
 (T C), 82c; George (H C), 17  
 Zinc and lead, northern Arkansas: Adams  
 (G I), 04; Coeur d'Alene, Idaho: Umpleby,  
 17a  
 Zircon, Ashland, Va.: Watson, 13f  
 Ore segregation: Tolman, 16  
 Ore shoots. *See* Economic geology, and Ore  
 deposits, origin.  
 Oregon.  
 Bibliography: Henderson, 12  
 Cascade Mountains: Cope, 88p; and Columbia  
 River region: Rath, 84g  
 Cascade Range: Williams (I A), 16  
 Coast region: Goodyear, 73  
 Crater Lake, geologic history: Diller, 12  
 Fulgurite, Mount Thielsen: Diller, 84d  
 General: Becker, 85; Condon, 69, 10; Diller, 84a;  
 Rath, 84  
 Human implements in an abandoned river  
 channel: Kemp, 07f  
 John Day region: Merriam, 99b  
 Prehistoric Siskiyou Island and Marble Halls:  
 Watson (C B), 09  
 Reconnaissance, southern Oreg.: Russell, 84  
 Report of survey: Oreg B M, 15; Parks (H M),  
 16  
 Silver Lake fossil beds: Anon, 77b  
 Silver Lake region: Cope, 89m  
 Submerged trees, Columbia River: Blake  
 (W P), 67h, 75; Dutton, 87; Emmons  
 (S F), 87c  
 Survey: Williams (I A), 15  
 Three Sisters region: Smith (W D), 10c  
 Economic geology.  
 Baker district: Grant (U S), 14



## Oregon—Continued.

*Economic geology—Continued.*

- Beach gold and its source: Washburne, 04a  
 Bohemia district, western Oreg.: Diller, 00;  
     Kimball, 02; MacDonald (D F), 09  
 Borate of lime: Chase, 73a  
 Borax, southern Oreg.: Dennis, 02  
 Building stone: Parks (H M), 14; Stafford, 04;  
     Portland region: Darton, 09b  
 Cascades: Smith (W D), 17  
 cement materials: Darton, 09b; Eckel, 13; Parks  
     (H M), 12a; Stafford, 04  
 Clay deposits: Geijsbeek, 13; Parks (H M), 12a;  
     Stafford, 04; Portland: Darton, 09b  
 Coal: Brown (R), 70; Goodyear, 77; Norton, 91;  
     Parks (H M), 12a; Ritter, 06b; Smith  
     (G O), 02; Stafford, 04  
 Coos Bay field: Diller, 99, 01, 11c; Rockwell,  
     02  
 Eden Ridge field, Coos Co.: Leshner, 14  
 Morrow Co.: Mendenhall, 09e  
 northwestern Oreg.: Diller, 96  
 Portland: Diller, 05b  
 Rogue River valley: Diller, 09  
 southwestern Oreg.: Winchell (A N), 14a  
 Squaw Creek basin, Coos Co.: Williams (I A),  
     14  
 Willow Creek, Morrow Co., coal prospect:  
     Mendenhall, 09e  
 Cobalt ore, Grant Co.: Bryan, 77  
 Copper: Stafford, 04; Weed, 06  
     Blue Mountains: Lindgren, 01  
     Grants Pass: Diller, 09a  
     Riddles quadrangle: Kay, 08a  
 Seven Devils and Snake River districts: Reid  
     (G D), 07  
     southwestern Oreg.: Winchell (A N), 14a  
 Cracker Creek district, Baker Co.: Lammers, 00;  
     Pardee, 09  
     Curry Co.: Butler (G M), 16  
     Eastern Oreg.: Barrell (R W), 96  
 Economic resources: Parks (H M), 12a  
 Gas and oil prospects near Vale: Washburne, 11  
 Gas prospects in Harney Valley: Washburne,  
     11a  
 General: Newberry, 56  
 Gold: Blake (W P), 55c; Lincoln, 11b; Stafford,  
     04; Thevenet, 60  
     Baker Co.: Melzer, 10  
     beach, source: Washburne, 04a  
     Blue Mountains: Lindgren, 01  
     Bohemia region: Diller, 00; MacDonald (D F),  
     09  
     Cracker Creek district: Pardee, 09  
     Curry Co.: Butler (G M), 16  
     eastern Oreg.: Bailey (E G), 97; Barrell  
     (R W), 98; Beadle, 02  
     Grants Pass: Diller, 09a  
     northwestern Oreg.: Diller, 96  
     placer, distribution: Washburne, 04  
     placers, southern Oreg.: Van Wagenen, 00  
     Riddles quadrangle: Diller, 08a; Kay, 08  
     Rye Valley: Mathez, 09  
     Snake River gravel bars: Washburn, 00  
     southwestern Oreg.: Winchell (A N), 14a  
     Sumpter and Granite districts: Pardee, 10  
     Waldo placers: Nicol, 00

## Oregon—Continued.

*Economic geology—Continued.*

- Grants Pass: Diller, 09a  
 Gypsum: Lindgren, 04c; Parks (H M), 12a;  
     Stafford, 04  
 Iron: Stafford, 04; Whittier, 17  
     northwestern Oreg.: Diller, 96  
     Portland: Diller, 05a  
 Jackson and Josephine cos.: Winchell (A N),  
     14a  
 John Day region: Collier, 14  
 Lignite, John Day region: Collier, 14  
 Limestone: Darton, 09b; Parks (H M), 12a;  
     Williams (I A), 14a  
 Manganese: Anon, 18b; Lake Creek: Pardee,  
     18d  
 Mineral resources: Drake, 05; Oreg B M, 15a;  
     Stafford, 04  
 Mines and prospects, southwestern Oreg.:  
     Diller, 12a  
 Mining districts: Parks (H M), 16a  
 Natural gas: Parks (H M), 12a  
     Harney Valley: Washburne, 11a  
     Vale: Washburne, 11  
 Nickel, Douglas Co.: Clarke (F W), 88a; Ledoux,  
     01  
     Riddle: Austin, 98b; Foullon, 92  
 Nickel Mountain: Kay, 07  
 Nitrate deposits, eastern Oreg.: Mansfield, 15;  
     southeastern Oreg.: Williams (I A), 18  
 Northeastern Oreg.: Swartley, 14  
 North Pole mine, Baker Co.: Melzer, 10  
 Northwestern Oreg.: Washburne, 14  
 Petroleum: Parks (H M), 12a  
     northwestern Oreg.: Washburne, 14  
     Vale: Washburne, 11  
 Placer gravels, Sumpter and Granite districts:  
     Pardee, 10  
 Placer mines, Riddles quadrangle: Diller, 08a  
 Platinum: Thevenet, 60  
 Port Orford quadrangle: Diller, 03  
 Potassium nitrate: Nattress, 18  
 Quicksilver: Demaret, 04; Dennis, 03; Stafford,  
     04; Wendeborn, 04a  
 Road materials: Parks (H M), 12  
 Sand: Parks (H M), 12a; Portland: Darton, 09b  
 Seven Devils and Snake River districts: Reid  
     (G D), 07  
 Silver: Lang, 87; Stafford, 04; Blue Mountains:  
     Lindgren, 01  
 Southern Oreg.: Fleck, 00  
 Southwestern Oreg.: Diller, 14a  
 Stone: Parks (H M), 12a  
 Structural materials: Darton, 09b  
 Sumpter quadrangle: Pardee, 14  
*Historical geology.*  
 Applegate region: Diller, 09a  
 Baker district: Grant (U S), 14  
 Blue Mountains: Lindgren, 01  
 Bohemia region, western Oreg.: Diller, 00  
 Cape Blanco: Martin (B), 16  
 Cascade Mountains: Condon, 79; Diller, 84, 96,  
     96b; Lang, 88; Smith (W D), 17; Willis,  
     88a  
     east of: Gibbs, 55b  
 Central Oreg.: Russell, 05  
 Clarno dam site: Williams (I A), 16b



## Oregon—Continued.

*Historical geology—Continued.*

- Columbia River basin: Collier, 16  
 Columbia River gorge: Chaney, 18; geologic history: Williams (I A), 16a  
 Coos Bay coal field: Diller, 99  
 Coos Bay quadrangle: Diller, 91  
 Crater Lake National Park: Diller, 92  
 Cretaceous: Becker, 91b  
 Cretaceous and Tertiary: Diller, 93  
 Curry Co.: Butler (G M), 16  
 Dayville reservoir site: Collier, 16a  
 Eastern Oreg.: Barrell (R W), 96; Ickes, 10  
 Eden Ridge coal field, Coos Co.: Leshner, 14  
 Eocene: Arnold, 14a; Diller, 97a  
 Franciscan sandstone: Davis (E F), 18  
 General: Condon, 74, 92; Hall, 45; McCornack, 96; Newberry, 56; Smith (W D), 16a  
 Glauconitic schists: Louderback, 96a  
 Grants Pass region: Diller, 99a  
 Harney Basin region: Waring, 99  
 Infusorial deposits, River Chutes: Ehrenberg, 49  
 Jackson and Josephine cos.: Winchell (A N), 14a  
 John Day Basin: Calkins, 92; Collier, 14; Condon, 71; Knowlton, 92; McClung, 96; Merriam, 91, 91a, b, 97  
 John Day beds: Merriam, 90a  
 Jurassic strata: Daqué, 11; Hyatt, 94a  
 Klamath Mountains: Anderson (F M), 92a; Diller, 94a; Hershey, 91b, 12b; granites, age: Hershey, 91b  
 Knoxville beds: Stanton, 95; local silicification of: Diller, 98c  
 Lava flood: Le Conte, 73a  
 Marine sediments, eastern Oreg.: Washburne, 93  
 Mesozoic sediments: Diller, 97; southwestern Oreg.: Louderback, 95  
 Miocene: Newberry, 69b  
   Astoria and Coos Bay: Dall, 99b  
   John Day River: Sternberg, 81  
 Miohippus beds, John Day Basin: Marsh, 94e  
 Northeastern Oreg.: Sternberg, 84a  
 Northwestern Oreg.: Diller, 96; Washburne, 14  
 Oligocene: Anderson (F M), 14a; Clark (B L), 18a  
 Pleistocene: McCornack, 14  
 Pliocene, Snake River valley: Cope, 83y  
 Port Orford quadrangle: Diller, 93  
 Rogue River Valley, Cretaceous: Anderson (F M), 95  
 Roseburg quadrangle: Diller, 98  
 Satsop formation: Bretz, 17  
 South central Oreg.: Waring, 98  
 Southeastern Oreg.: Russell, 93  
 Southwestern Oreg.: Diller, 12a, 14a  
 Strata with Jurassic flora: Diller, 98  
 Sumpter quadrangle: Pardee, 14  
 Tertiary: Arnold, 99b; Cope, 81g; marine: Arnold, 13  
 Triassic, Baker Co., section: Smith (J P), 12a; northeastern Oregon: Lindgren, 91c
- Mineralogy.*  
 Awaruite, Josephine Co.: Jamieson, 95  
 Erionite, Durkee: Eakle, 98a

## Oregon—Continued.

*Mineralogy—Continued.*

- General: Mitchell, 15  
 Gold quartz veins, eastern Oreg.: Lindgren, 91b  
 Josephinite: Melville, 92  
 Meteorite: Jackson, 591  
   Clackamas: Kunz, 94a  
   Sams Valley, Jackson Co.: Foote (W M), 15  
   Willamette, Clackamas Co.: Eberle, 95; Hovey, 96c; Ward (H A), 94a  
 Nickel ore, Piney Mountain, Douglas Co.: Hood, 83  
 Opal, fibrous form: Merrill (G P), 18d  
 Priceite, Curry Co.: Larsen, 17d  
 Stibnite: Santos, 77a
- Paleontology.*  
 Anchitherium, Truckee beds: Cope, 79o  
 Aves, Equus beds: Schufeldt, 91, 91a, 92  
   Oregon desert: Schufeldt, 13, 13c  
   Pleistocene: Schufeldt, 13a; Fossil Lake: Miller (L H), 11  
   Silver Lake: Schufeldt, 91 b, c, 92a  
 Bear, Pliocene: Merriam, 16b  
 Canis, John Day beds: Condon, 96  
 Clallam formation: Reagan, 10  
 Corals: Nomland, 17; Cretaceous and Tertiary: Nomland, 16  
 Desmostylus: Hay (O P), 15a  
 Dicotylinae, John Day beds: Cope, 88h  
 Eagle Creek flora, Columbia River gorge: Chaney, 18  
 Edentate-like remains, Mascall beds: Sinclair, 96  
 Eocene flora and fossils: Diller, 97a  
 Eocene Mollusca: Conrad, 65g  
 Flower, John Day beds: Knowlton, 91c  
 Fulgur: Conrad, 53  
 General: Condon, 92; Hall, 45d; Smith (W D), 16a  
 Hipparion group: Merriam, 15c  
 Hippidium, Loup Fork beds: Cope, 80f  
 Horse, Mascall beds: Gidley, 96a  
 Infusoria: Bailey (J W), 45, 45d  
 Infusorial deposits, River Chutes: Ehrenberg, 49  
 Invertebrata: White (C A), 89a  
 John Day Basin: Blake (W P), 67b; Condon, 71; Merriam, 91a, b  
   flora: Knowlton, 92  
   Mollusca: Stearns, 90, 92, 96  
   rodents and ungulates: Sinclair, 95  
 Jurassic flora: Knowlton, 10d; Ward (L F), 95  
 Mammalia: Perkins (H C), 42a  
   Ironside: Merriam, 16d  
   John Day region: Leidy, 70p  
   Miocene: Marsh, 73c  
 Merycochoerus, John Day beds: Bettany, 76  
 Mesozoic and Cenozoic plants: Knowlton, 10a  
 Miocene fauna: Sternberg, 81g  
   Astoria and Coos Bay: Dall, 99b  
   flora and fauna: Newberry, 69b  
   John Day River: Sternberg, 81  
   Mammalia: Cope, 79c, 80  
   Vertebrata: Cope, 79a  
 Miohippus beds, artiodactyls: Marsh, 94e, f  
 Mollusca, Astoria: Conrad, 49a  
 John Day and Mascall beds: Stearns, 96



## Oregon—Continued.

*Paleontology—Continued.*

- Northeastern Oreg.: Sternberg, 84a  
 Parietis, John Day beds: Scott, 93b  
 Plantae: Newberry, 83f; Cascade Mountains: Knowlton, 00d  
 Pleistocene Mammalia: McCornack, 14  
 Pliocene faunas: Merriam, 17a  
   Mammalia: Cope, 89d  
   Snake River valley: Cope, 83y  
   southern Oreg.: Sternberg, 81a  
 Plioplarchus: Cope, 89f  
 Pontoleon, Miocene: True (F W), 05  
 Prehistoric tree, Oswego: Nye, 84  
 Roseburg quadrangle: Dickerson, 14  
 Sea lion, Miocene: True (F W), 09  
 Seal, Miocene: Condon, 06; Wortman, 06  
 Silver Lake fossil fields: Sternberg, 84  
 Tapir: Merriam (J C), 13; Sinclair, 01  
 Temnocyon and Hypotemnodon, John Day beds: Eyermann, 94, 96  
 Tephrocyon: Merriam (J C), 13c  
 Tertiary: Shumard (B F), 58a  
   fresh-water Mollusca: Hannibal, 12  
   John Day region: Merriam, 07  
   Mammalia: Cope, 78i  
   shells near Astoria: Conrad, 48  
 Ticholeptus beds fauna: Cope, 86c  
 Turtles, John Day Basin: Hay (O P), 03a  
 Vertebrata: Leidy, 70g, 72b; Meany, 06; Perkins (H C), 42, 42a

*Petrology.*

- Crater Lake National Park: Diller, 02  
 Crystalline rocks, southern Oreg.: Dutton, 91  
 General: Diller, 84f  
 Glauconite schists: Louderback, 06a; Washington, 01a  
 Jackson and Josephine cos.: Winchell (A N), 14a  
 John Day Basin: Calkins, 02  
 Mount Pitt: Emmons (A B), 86  
 Port Orford quadrangle: Diller, 03  
 Radiolarian charts: Smith (W D), 16

*Physical geology.*

- Cascade Mountains, structure and age: Le Conte, 73a  
 Cracker Creek gold district, Baker Co., faulting and vein structure: Pardee, 09  
 Fulgurite, Mount Thielson: Diller, 84e  
 Glaciers, Mount Hood: Reid (H F), 05c, 06  
   Mount Jefferson: Hatch, 17a  
   Three Sisters: Williams (I A), 16c  
 Interstream erosion, southern Oreg.: Hershey, 00d  
 Mount Hood, volcanic activity: Jillson, 17b; recent volcanic activity and glaciers: Sylvester, 08  
 Prairie mounds, origin: Le Conte, 77a  
 Stalactites of sand: Diller, 99b

*Physiographic geology.*

- Block faulting, Klamath lakes region: Johnson (D W), 18  
 Camas swale: Diller, 97b  
 Cascade Range: Williams (I A), 16  
 Cascades of Columbia River, origin: Blake (W P), 75  
 Central Oreg.: Russell, 05

## Oregon—Continued.

*Physiographic geology—Continued.*

- Columbia River gorge: Chaney, 18; geologic history: Williams (I A), 16a  
 Crater Lake: Diller, 96c, 97, 02b, 11d; Dutton, 86; Margerie, 13; Patton, 02  
 General: Condon, 74; Dana (J D), 49c  
 Harney Basin region: Waring, 09  
 John Day region: McClung, 06  
 Klamath Mountains: Anderson (F M), 01, 02a; Diller, 96a, 02a  
 Mount Hood: Reid (H F), 02  
 Mount Mazama: Diller, 02b  
 Mount Pitt: Emmons (A B), 86  
 Roseburg quadrangle: Diller, 98  
 Siskiyou Range: Anderson (F M), 03  
 South central Oreg.: Waring, 08a  
 Southeastern Oreg.: Russell, 03  
 Southern Oreg.: Biddle, 88  
 Three Sisters: Fairbanks, 01b  
 Volcanoes: Hague, 83  
 Willamette Sound: Condon, 71a  
*Underground water.*  
 General: Van Winkle, 14a  
 Central Oreg.: Russell, 05  
 Harney Basin region: Waring, 09  
 Mineral waters, southwestern Oreg.: Winchell (A N), 14a  
 Southeastern Oreg.: Russell, 03a  
 Oreodon, osteology: Scott (W B), 85c  
 Oreodontidae: Cope, 84f, p; Scott (W B), 89a, 90b  
 Organ Mountain district, N. Mex.: Welsh, 14  
 Organic deposits of the sea: Vaughan, 17b  
 Origination of self-generating matter and the influence of aridity upon its evolutionary development: Macdougall, 09  
 Ornithichnites: Bouvé, 54; Deane, 43; Field, 60; Hitchcock (E), 36; Rogers (H D), 41b  
 Ornitholestes, Jurassic, Wyoming: Osborn, 03a  
 Ornithopoda, Jurassic: Marsh, 94d  
 Oro Blanco district, Ariz.: Milton, 13  
 Orogenic epochs: Blackwelder, 14  
 Orogeny.  
   Absaroka Range, Wyo.: Hague, 01  
   Abyssal igneous injection: Daly (R A), 06b  
   Appalachian revolution: Willis, 07e  
   Appalachian structure, mechanics of: Willis, 93b  
   Appalachian Mountains: Claypole, 85b; Dana (J D), 63c; Hitchcock (C H), 78b; Rogers (H D), 50c; Shaler, 71, 77f; northern: Willis, 95; southern: Hayes, 95f  
   structure: Rogers (H D), 43c; Rogers (W B), 43  
   Arizona: Gilbert, 75a  
   Atlantic system: Hitchcock (C H), 76b, 78b  
   Basin-range structure: Burling, 12; Keyes, 05a, 13; Louderback, 04a; Paige, 13a  
   Basin ranges, origin and structure: Spurr, 01a  
   British Columbia, Rocky Mountains: Dawson (G M), 95e  
   California: Marcou, 83  
   Coast Range: Le Conte, 76  
   Inyo Range; Knopf, 18  
   southern: Marcou, 76  
   Cascade Mountains: Lang, 88; Willis, 88a; structure and age, Le Conte, 73a



**Orogeny—Continued.**

- Cause:** Hixon, 11  
**Central America:** Sapper, 05c  
**Classification of mountain ranges:** Rice (W N), 05; Upham, 91g  
**Colorado Plateau province:** Gilbert, 76a  
**Cordilleran region:** Emory, 58; Howorth, 91; King (C), 78a, 00; Lindgren, 15a; Ransome, 15  
     tectonic lines of northern part: Joerg, 10  
**Crenitic hypothesis:** Shaler, 88g  
**Deformation in Great Basin ranges:** Baker (C L), 13  
**Desert ranges, profiles and geologic structure:** Keyes, 10f  
**Fan structure, Canadian Rocky Mountains:** Keyes, 17f  
**Formation of mountains:** See, 08a, b; cause: See, 06a, 07a  
**General:** Agassiz, 63e; Barrell, 14a, 18a; Billings, 60f; Burckhardt, 04; Dana (J D), 47a, 73d, e, 79; Dutton, 76; Foster, 51a, h; Frech, 12a; Gilbert, 75; Hall, 57c, 60j; Hitchcock (C H), 70e, 77c; Howell (E E), 75; Hunt, 61a, 67e, 73d, 75; Le Conte, 72, 78a, 93; Muir, 75; Nutting, 11; Powell, 76, 76a; Reade, 89, 92; Reid (H F), 11a, 12d, g; Reyer, 92; Rogers (H D), 58d; Shaler, 66c; 88g, 94b; Silliman, 37a; Taylor (W B), 85; Thayer, 18; Vose, 66; Walling, 79, 79a; Wells (H G), 93; Whitney, 71a; Whittlesey, 74; Willis, 05  
**Great Basin ranges:** Davis (W M), 03a; Gilbert, 84a; Keyes, 08g, 09b, k, 10f  
**Great Plains:** Willis, 02b  
**Green Mountains, age:** Dana (J D), 80b  
**Klamath Mountains, Oreg.:** Diller, 96a  
**Laccolithic intrusion, mechanics of:** Keyes, 18f  
**Laccolithic mountains, origin:** Keyes, 18c  
**Mechanics of Allegheny structure:** Ashley, 08  
**Mechanics of formation of arcuate mountains:** Hobbs, 14a  
**Mechanics of mountain formation:** Winchell (A), 85  
**Mexican plateau:** Hill (R T), 07  
**Mexico, Chiapas and Tabasco:** Böse, 05; Sierra Madre: Böse, 01  
**Mountain chains, parallelism:** Desor, 50l  
**Monoclinial ridges:** Powell, 80a  
**Mountain elevation, effect on temperature:** Wallace (S J), 81  
**Mountain systems of North America:** Marcou, 54  
**New Mexico:** Gilbert, 75a; Herrick, 04c; Keyes, 05g; Deming quadrangle: Darton, 17  
**North America:** Bailey (L W), 95a  
**Origin of mountain ranges:** Reade, 91  
**Orogenic epochs:** Blackwelder, 14  
**Orark Mountains:** Keyes, 95g  
**Pacific coast region:** Diller, 15b  
**Paleozoic orogenic movements, periodicity:** Chamberlin (R T), 14  
**Pennsylvania:** Chittenden, 97; Appalachian Mountains: Claypole, 84g  
**Physics of the earth:** See, 08  
**Post-Paleozoic:** Keyes, 14d

**Orogeny—Continued.**

- Rifted relict-mountain:** Clarke (J M), 15c  
**Rocky Mountain region, Canada:** Dawson (G M), 01  
**Rocky Mountains:** Dana (J D), 63c, 90f; Emmons (S F), 90; Hayden, 62b; Hills, 91c, 95a; Schofield, 14c; Stevenson, 75  
     age: Peale, 77b  
     origin and development: Blackwelder, 15b  
**Sierra Nevada:** Alling, 14; Lang, 88; Le Conte, 86; Muir, 75, 75a; Turner, 96; Tertiary-Quaternary orogenic history: Matthes, 16  
**Structure of mountains:** Powell, 76a  
**Subtuberant mountains:** Emmons (S F), 99  
**Summit level accordance:** Daly (R A), 05a  
**Synclorium and anticlinorium:** Rice (W N), 06b  
**Tertiary mountain belt:** Taylor (F B), 10  
**Types of orographic structure:** Powell, 76a  
**Wasatch Mountains:** Gilbert, 80c  
**Western United States:** White (C A), 88d  
**Wyoming, southwestern:** Rich, 10  
**Orography.**  
     **Central America:** Durocher, 60, 60a  
     **Cordillera:** Blake (W P), 57a; Emory, 57a  
**Orotaxial geologic correlation and distrophism:** Keyes, 09o  
**Orotaxis, a method of correlation:** Keyes, 96g  
**Oroville-Nighthawk district, Wash.:** Umpleby, 11a  
**Orthoclase as a vein mineral:** Rogers (A F), 12g  
**Orthoclase twins of unusual habit:** Ford, 08a  
**Orthocynodon:** Scott, 82, 83  
**Orton, Edward, biography:** Gilbert, 00a, b; Hobbs, 02c; Hovey, 99a; Ohio St Univ, 99; Stevenson, 00a; White (I C), 00; Anon, 00  
**Orycterotherium, Missouri:** Harlan, 43  
**Osars, origin:** Colton, 02; Todd, 84  
**Osborn, H F., biography:** Woodward (A S), 17  
**Osceola district, Nev.:** Weeks, 08  
**Oscillation.** See Changes of level.  
**Osteogenesis, Cretaceous:** Moodie, 16b  
**Ostracoda.** See also Crustacea.  
     **American Paleozoic:** Ulrich, 06a  
     **Arkansas, Fayetteville shale fossils:** Girty, 10a  
     **Beecherella, Lower Helderberg, New York:** Ulrich, 91  
     **Beechey Island:** Jones (T R), 58b  
     **California, Pliocene:** Chapman (F), 96  
     **Cambrian:** Jones (T R), 02  
     **Canada:** Jones (T R), 58, 58b, c, 95; Ordovician, Silurian, and Devonian: Jones (T R), 91  
     **Caney shale fauna, Oklahoma:** Girty, 09b  
     **Carboniferous, Cape Breton:** Jones (T R), 89b; Nova Scotia: Jones (T R), 84  
     **Chazy:** Raymond (P E), 11  
     **Cincinnati:** Miller (S A), 74b, 81d  
     **Colorado:** Jones (T R), 86; Florissant: Cockerell, 10b  
     **Cypridina antiqua, Trenton, Ontario:** Jones (T R), 04  
     **Devonian:** Jones (T R), 90a  
     **Isochilinae, Canada:** Jones (T R), 03  
     **Laperditiae and allied forms:** Jones (T R), 84a  
     **Manitoba:** Jones (T R), 89a



**Ostracoda—Continued.**

- Maryland, Devonian, Lower: Ulrich, 13c;  
Middle: Kindle, 13; Upper: Clarke (J M),  
13c  
Paleozoic: Jones (T R), 05  
Moorefield shale fauna: Girty, 11  
New Brunswick: Jones (T R), 89a  
New York, Devonian: Hall, 62b  
Lower Helderberg: Ulrich, 91  
Pleasant Valley: Dwight, 90a  
Nova Scotia, Arisaig: Jones (T R), 70  
Cape Breton, Cambrian: Matthew (G F), 02c  
Carboniferous: Dawson (J W), 97c  
Ordovician: Ulrich, 92b  
Manitoba: Ulrich, 89  
Minnesota: Ulrich, 97a  
Ostodolepis brevispinatus: Williston, 13  
Paleozoic: Jones (T R), 90; Ulrich, 90f, 00  
Park City formation phosphate beds fauna:  
Girty, 10  
Pennsylvania: Jones (T R), 58a, b; Devonian  
and Silurian: Jones (T R), 89  
Post-Tertiary, Quebec and Maine: Brady, 71  
Silurian, Appalachian region: Ulrich, 17a;  
Indiana, Ohio, and Kentucky: Foerste,  
09  
Stratigraphic significance: Bassler, 11f  
Utah, Cretaceous: Jones (T R), 93  
Wyoming, Cretaceous: Jones (T R), 93  
Otozoum, Connecticut Valley: Hitchcock (E), 56c  
Ouray fauna: Girty, 00  
Ouray folio, Colo. (no. 153): Cross, 07a  
Ouray limestone fauna: Kindle, 09  
Outcrop of ore bodies: Emmons (W H), 09a  
Outlier, Ordovician, in Sudbury, Vt.: Dale, 12a  
Overlap, sedimentary: Grabau, 07  
Overlook Mountain, N. Y., structure and glaciation:  
Stevens (N E), 12  
Overthrusting, United States: Willis, 04  
Ovibos: Lambe, 07a  
Ovid quadrangle, N. Y.: Luther, 09  
Owen, D. D., biography: Peter (R), 61a; Anon,  
61, 89  
Owen, Richard, biography: Jordan, 97; Winchell  
(N H), 90  
Owens Basin, Cal.: Gale, 14g  
Owens Valley, Cal.: Lee (W T), 06; terrestrial  
deposits: Trowbridge, 11  
Owl Creek Mountains: Darton, 06  
Oxyaena: Osborn, 00b; restoration: Wortman, 00a  
Oxydactylus campestris: Cook (H J), 09  
Oxyrhina: Eastman, 95  
Oyster shell deposits on Atlantic coast: Vanuxem,  
41a  
Ozark Mountains: Keyes, 95g  
Ozark region: Bain, 01; Purdue, 16  
Ozark series: Broadhead, 91, 93, 93a, b, 98; Nason,  
93b; classification: Winslow, 93a  
Ozark uplift, magnesian series: Nason, 93  
Ozarkian epoch: Hershey, 96d; Le Conte, 99;  
McGee, 96a; Upham, 96k  
Ozarkian seaweeds and oolites: Wieland, 14  
Ozokerite.  
General: Gosling, 94; Lay, 83; Ohly, 00  
Oregon: Stafford, 04  
Texas, Thrall oil field: Schoch, 16

**Ozokerite—Continued.**

- Utah: Clayton, 79; Higgins, 13; MacFarren,  
09a; Ohly, 00; Taff, 06c; eastern: Maguire,  
00b  
Pachyphyllum: Webster, 89a  
Pacific coast Tertiary faunas: Arnold, 09b  
Pacific Mountain system, British Columbia and  
Alaska: Spencer (A C), 03c  
Pacific States: Rath, 85c  
Paint. See Mineral paints.  
Painted Desert, Ariz.: Carter (O C S), 04  
Palaeocampa: Scudder, 82b  
Palaeochinoidea: Jackson, 96a; Paleozoic, revision:  
Klem, 04  
Palaeospondylus: Dean, 96, 99  
Palaeosyops: Earle, 91, 91a, 92, 95; Leidy, 71g  
Palaeotherium: Prout, 47  
Paleobotany.  
Alabama, Carboniferous: Lesquereux, 76f  
Eocene: Langdon, 93  
Gadsden: Lesquereux, 88b  
Pleistocene flora: Berry, 10h  
Tuscaloosa flora: Berry, 13  
Tuscaloosa coal field: Bunbury, 46; Lyell, 46c  
Widdringtonites: Berry, 12b  
Alaska: Heer, 69; Knowlton, 94, 94c, 96c  
Cape Lisburne, Jurassic flora: Knowlton, 06,  
14; White (D), 06b  
Cook Inlet, Miocene Plantae: Heer, 68a  
Cretaceous and Tertiary floras: Hollick,  
11c, 13a  
Kenai flora: Hollick, 11b  
Kukak Bay: Knowlton, 04  
Miocene: Lesquereux, 83a  
Miocene and Cretaceous: Eichwald, 71  
Mount St. Elias region: Knowlton, 91a  
Yukon Valley: Knowlton, 98a, 04a  
Alberta, Belly River beds: Dawson (J W), 85c  
Bow River: Dawson (J W), 90d  
Cretaceous: Dawson (J W), 88d  
Red Deer River: Penhallow, 02a  
Tertiary: Penhallow, 05a  
Algae: James (J F), 85a  
Devonian, Ohio: Lesquereux, 90; Wisconsin:  
Cleland, 11  
Trenton limestone, New York: Ruedemann,  
09a  
Algonkian algal flora: Walcott, 14  
Allegheny series plants: White (D), 00a  
Alum Bluff flora: Berry, 16b  
Amber, Coastal Plain: Berry, 07  
Laramie Cretaceous: Cockerell, 09m  
Staten Island: Hollick, 05, 05a, 06a  
Amber-producing tree: Knowlton, 96e  
Amboy clays flora: Newberry, 86a, 95  
Ancestors of big trees: Berry, 05e  
Aneimites: Ward (L F), 05a; seeds: White (D),  
05  
Angiosperms, antiquity: Sinnott, 16a  
Anomalofilicites, Dawson Co., Mont.: Hollick,  
16  
Anomalophyllites, Bridgeton, N. J.: Hollick,  
97a  
Antholithes, Florissant: Cockerell, 15c  
Anthracite, vegetation: Teschemacher, 48  
Aralia: Berry, 03c  
Araucarian genus, Arizona Triassic: Jeffrey, 10



## Paleobotany—Continued.

- Araucarian remains, Atlantic Coastal Plain: Berry, 08a  
 Araucarias, western Cretaceous: Wieland, 10  
 Araucariopitys: Jeffrey, 07  
 Araucarioxylon: Gordon (W T), 09; Jeffrey, 12; Knowlton, 88, 90  
 Carbon Co., Wyo.: Knowlton, 00b  
 Connecticut: Knowlton, 01  
 Archean plant, Sussex Co., N. J.: Britton, 88a  
 Archihicoria: Barbour, 98b  
 Arctic regions: Heer, 68; Nathorst, 12; Saporta, 68  
 Banks Land: Cramer, 68  
 Ellesmere Land: Nathorst, 04; Tertiary: Nathorst, 15  
 Grinnell Land: Heer, 78  
 Nuphar: Fritel, 14  
 Tertiary: Gardner (J S), 79; Heer, 79a  
 Arizona, Cretaceous: Newberry, 61  
 petrified forests: Briscoe, 14; Knowlton, 13b; Ward (L F), 00a, d  
 silicified wood: Gordon (W T), 09  
 Arkansas: Lesquereux, 60; Prosser, 92a  
 Bingen sand: Berry, 17a  
 Coal Measures: White (D), 07b  
 eastern, Tertiary silicified wood: Call, 91a  
 woods and lignites: Knowlton, 91  
 Arthropycus: James (J F), 93a  
 Atlantic Coastal Plain, Tertiary: Berry, 171  
 Autophytographs: Cobb, 06b; White (C H), 05  
 Bauhinia, Alabama: Berry, 10g; Cretaceous: Berry, 08b; New Jersey: Newberry, 86b  
 Bennettiteae, proembryo: Wieland, 04a  
 Bennettites, South Dakota: MacBride, 93  
 Brandon, lignite fossils: Ami, 06c; Jeffrey, 06a; Perkins (G H), 05a, 06, 06a  
 British Columbia: Dawson (J W), 73a, 91d  
 Cretaceous: Dawson (J W), 83a; Penhallow, 02a  
 East Kootenay, Pleistocene flora: Hollick, 14  
 Kettle River region: Penhallow, 07d  
 Kootenay Valley, Ficus: Hollick, 15; Pleistocene: Schofield, 15  
 Peace River region, Cretaceous: Dawson (J W), 81a  
 Queen Charlotte Islands, Osmundites: Penhallow, 02  
 southern, Tertiary: Dawson (J W), 79b, 83a; Penhallow, 02a, 08b  
 Vancouver City, Tertiary: Dawson (J W), 95b  
 Vancouver Island: Heer, 59, 65; Lesquereux, 59; Richardson (J), 72a; Dawson (J W), 94c  
 Buthotrephis, Silurian, Indiana: White (D), 01  
 Calamites: Dawson (J W), 69  
 Kansas: Knox, 75  
 Pennsylvania: Gresley, 93a  
 structure and affinities: Dawson (J W), 70h  
 upright, Pictou, N. S.: Dawson (J W), 51  
 Calamites and Calamodendron: Dawson (J W), 69d  
 Calamodendron, structure and affinities: Dawson (J W), 70h  
 California, auriferous gravel deposits: Knowlton, 11; Lesquereux, 78c

## Paleobotany—Continued.

- California: Colorado Desert: Schaeffer, 57  
 Independence Hill flora: Lindgren, 96c  
 Oroville: Fontaine, 96a, 00a  
 Pliocene flora, Coast Ranges: Hannibal, 11  
 Posuncula River: Bailey (J W), 55, 57  
 silicified woods: Phillips (J A), 73  
 Callixylon: Elkins, 14  
 Calvert flora: Berry, 16c  
 Camptothecium, Kansan drift, Iowa: Grout (A J), 17  
 Canada: Wilson (W J), 12, 14  
 Carboniferous: Dawson (J W), 73  
 Cretaceous floras: Dawson (J W), 88a  
 Devonian and Silurian: Dawson (J W), 71b  
 forty-ninth parallel: Dawson (J W), 75b  
 Paleozoic floras: Dawson (J W), 82d  
 Pleistocene: Dawson (J W), 90; Penhallow, 96  
 Carapa, Eocene: Berry, 17e  
 Carboniferous: Dawson (J W), 68b, 90a; Lesquereux, 77; Newberry, 56a; Williamson, 83; Wood (H C), 60, 60a  
 Appalachian region: Morton, 36  
 eastern Canada: Dawson (J W), 55  
 Missouri: White (D), 99  
 New Mexico, Socorro: Herrick, 04  
 Nova Scotia: Dawson (J W), 63f; and New Brunswick: Dawson (J W), 66  
 Ohio: Hildreth, 36b  
 Tennessee, Tracy City: Brown (C S), 92  
 Carboniferous conifers: Dawson (J W), 75c  
 Carboniferous plant tissue, Nebraska: Barbour, 15i  
 Cardiocarpus, Iowa: Jones (A J), 94a  
 Carpolithes, Brandon, Vt.: Hitchcock (C H), 62c  
 Catahoula sandstone flora: Berry, 16e  
 Catalog of plants: Teschemacher, 46  
 Caulinites: Hollick, 97b; Ward, 84c  
 Chara, Bear River formation, Wyo.: Knowlton, 93c  
 Las Vegas, N. Mex.: Knowlton, 02d  
 Wasatch group, Utah: Knowlton, 88c  
 Charred wood, fossil: Hollick, 06c  
 Chip, fossil: Nicholson, 73e  
 Citronelle flora: Berry, 16d  
 Clathropteris: Berry, 18c; Massachusetts: Hitchcock (E jr), 55  
 Clifford clays, flora: Berry, 06d  
 Coal plants: Gresley, 99a; Lesquereux, 58b; Steinhauer, 18; Wood (H C jr), 69; Mississippi Valley: Keyes, 00e  
 Codonotheca: Sellards, 03b, 07d  
 Collections of New York Botanical Garden: Hollick, 11  
 Colorado, Colorado City, silicified wood: Nicholson, 75d  
 Denver Basin: Knowlton, 96  
 Florissant: Cockerell, 06b, d, 07a, 08j, l, m, o, 09m, 10a, e, f, g, 14g; Hollick, 07; Kirchner, 98; Knowlton, 16b  
 Fagopsis: Hollick, 09  
 flowers and fruits: Cockerell, 11e  
 Sequoia stumps: Warder, 83  
 Golden: Lesquereux, 88  
 Mesa Verde Cretaceous: Cockerell, 10  
 Middle Park: Cross, 95a



## Paleobotany—Continued.

- Colorado: Permian: Lesquereux, 82  
 southwestern, Cretaceous: Cockerell, 16a  
 Tertiary plants: Cockerell, 08j; Lesquereux: 74b  
 Comptonia: Berry, 06f  
 Coniferous plants, Coal Measures: Teschemacher, 52a  
 Coniferous trees: Bailey (J W), 45a  
 Coniferous wood: Ford (H C), 90  
   Devonian, Kentucky: Schaeffer, 51  
   Potomac formation: Sinnott, 16  
 Conifers, Cretaceous, structure: Thompson (W P), 12; Rancho La Brea, Cal.: Knowlton, 16f  
 Connecticut, Bristol, Triassic: Silliman (jr), 47a  
 Connecticut Valley, Newark group: Hitchcock (E), 43c  
 Coralline algæ in Ordovician dolomite: Blackwelder, 13c  
 Cordaites: Lesquereux, 78f; bearing fruit: Lesquereux, 79  
 Cordaites wood, Indiana: Elkins, 14  
 Correlation by plants: Ward (L F), 92a, 93  
 Cretaceous: Berry, 06, 06a, b, d; Dawson (J W), 86b, 93a; Gardner (J S), 84; Heer, 61; Hollick, 06, 06g; Lesquereux, 60a, 72a, 74a, 76d, 78a, b; MacMillan, 93; Newberry, 60, 68, 69, 81d, 86f, 98; Penhallow, 06  
 Block Island, R. I.: Hollick, 98  
 catalog: Knowlton, 98  
 Cliffwood, N. J.: Hollick, 97c  
 Fort Harker: Newberry, 71e  
 Greenland: Heer, 68b  
 Iowa, western: Bartsch, 96  
 Kansas and Nebraska: Lesquereux, 71  
 Lower, flora of world: Berry, 11a  
 Marthas Vineyard, Mass.: Hollick, 95d; White (D), 90  
 New York, Long Island: Hollick, 93a, 04, 12a; southern N. Y. and New England: Berry, 15a; Staten Island: Hollick, 92, 92a, 98a  
 Port McNeill, Vancouver Island: Dawson (J W), 89b  
 Upper: Berry, 16j; and Eocene, S. C. and Ga.: Berry, 14  
 Virginia and North Carolina: Berry, 09e  
 Cretaceous and Tertiary, Western States: Lesquereux, 82a  
 Cretaceous coniferous remains, New York: Hollick, 09a  
 Cretaceous forests: Mudge, 78a  
 Cretaceous Lycopodium: Berry, 10i  
 Cretaceous woods, Alberta: Penhallow, 08a  
 Cryptogam, Fort Union group: James (J F), 88e  
 Cucumites species, nomenclature: Cockerell, 03a  
 Cupressinoxylon: Knowlton, 88a; California: Conwentz, 78  
 Cycad localities, Jurassic, Wyoming: Marsh, 98b  
 Cycadean monoecism: Wieland, 99b  
 Cycads: MacBride, 94; Ward (L F), 94a, b, 96, 99, 00; Wieland, 99, 00b, 03b, 11, 14b, 16, 16a  
 American fossil: Wieland, 06b

## Paleobotany—Continued.

- Cycads: Black Hills: Calvin, 94; Ward (L F), 98  
 Cretaceous of Texas: Udden, 08a  
 historic: Wieland, 08  
 in Yale Museum: Ward (L F), 00b  
 Jurassic, Wyoming: Ward (L F), 00c  
 Maryland: Bibbins, 95  
 Mixteca Alta, Mex.: Wieland, 10a  
 phylogeny: Chamberlain, 15  
 Potomac formation: Ward (L F), 97a  
 South Dakota: MacBride, 93  
 Cycadella, Wyoming: Ward (L F), 00c  
 Cycadeoid wood structure: Wieland, 18  
 Cycadeoidea, floral structures: Wieland, 99; flower buds: Wieland, 12  
 Cycadinocarpus, Durham, Conn.: Chapin, 91a  
 Cycadofilices: White (D), 05a, d  
 Cypress, ancestry: Berry, 11k  
 Cypress swamp, Maryland: Bibbins, 98  
 Dadoxylon: Penhallow, 00; New York: Dawson (J W), 91c  
 Dakota flora: Lesquereux, 74, 74a, 76b, 83, 92; Kansas: Sternberg, 81f  
 Dakota sandstone, leaves: Gress, 18  
 Date palm fruit, Texas: Berry, 14f  
 Dendrophycus triassicus: Newberry, 90b  
 Devonian: Dawson (J W), 63b, 70d, 71g, 82a, 90a; Hall, 63i; Devonian: Matthew (G F), 12  
 Chaleur Bay: Dawson (J W), 81f  
 Gaspé: Dawson (J W), 59a  
 New Brunswick: Dawson (J W), 81c; Matthew (G F), 06a  
 New York: Dawson (J W), 81c  
 nomenclature: Dawson (J W), 89g  
 northeastern America: Dawson (J W), 62a  
 Devonian and Lower Carboniferous: Dawson (J W), 72a  
 Dewalquea, Cretaceous: Berry, 10c  
 Dicotyledons, oldest: Feistmantel, 89a  
 Dicotyledonous leaves, determination: Ward (L F), 86  
 Dicotyls, origin: Wieland, 14b, 18a  
 Dictyocordaites, Devonian, Pennsylvania: Dawson (J W), 89e  
 Diploxylon, Carboniferous, Nova Scotia: Dawson (J W), 77a  
 Distribution, glacial period: Transeau, 03  
 Drift plants: Newberry, 54, 74x  
 Dryopteris, Judith River formation: Knowlton, 15  
 Dunkard flora, Permian elements in: White (D), 04a  
 Eagle Creek flora, Columbia River gorge: Chaney, 18  
 Earliest plants: Dawson (J W), 88e  
 Endogen, supposed, Carboniferous: Knowlton, 93d  
 Engelhardtia, Eocene: Berry, 11i  
 Eocene: Gardner (J S), 84; Lesquereux, 73  
   Georgia: Berry, 10k  
   lower: Berry, 16a  
   Maryland: Clark (W B), 01a  
   southeastern North America: Berry, 14a  
   Texas: Vaughan, 95a  
 Eocene flower, Tennessee: Berry, 13



## Paleobotany—Continued.

- Elachras eocenica*, Mississippi: Berry, 15d  
*Eophyton*: Dawson (J W), 70a  
*Epidermis*, Carboniferous, Nebraska: Whitford, 16b  
*Equisetum*, Florissant: Cockerell, 15d; Schuylkill Co., Pa.: Harlan, 35a  
 Erect trees, South Joggins, N. S.: Dawson (J W), 82, 94f, 95a  
 Erian and Carboniferous: Dawson (J W), 90a  
*Esmeralda* formation: Knowlton, 00e  
*Eucalyptus*, Dakota beds, southwestern Kans.: Ward (L F), 97, 98a  
*Euphorbiaceae*: Cockerell, 09l  
 Evidence of plants as to geologic age: Dana (J D), 76b  
 Evolution in vegetable kingdom: Ward (L F), 85b  
 Evolution of plants: Scott (D H), 11  
 Exogenous structure in Paleozoic lycopods: White (D), 96a  
 Ferns: Hall, 45a; Knowlton, 11c  
     Carboniferous, Nova Scotia: Dawson (J W), 60e  
     Frostburg, Md.: Bunbury, 46a  
     Laramie beds, Colorado: Hollick, 02a  
     Sydney coal field, Cape Breton Island: Bunbury, 52  
*Ficus*, British Columbia: Hollick, 15  
     Cheyenne sandstone, Kansas: Berry, 05a  
     Fox Hills Cretaceous: Cockerell, 07l  
     Pleistocene, Kootenay Valley: Humphreys (E W), 15  
     Tuscaloosa formation, Alabama: Berry, 05a  
     Wyoming and Montana: Knowlton, 11d  
*Firmianites aterrimus*: Cockerell, 09j  
*Flabellaria*, mid-Cretaceous: Berry, 05b  
 Florida, Vero, Pleistocene: Berry, 17h, i  
 Flower, John Day beds, Oregon: Knowlton, 01c; Tertiary, Florissant, Colo.: Hollick, 07  
 Flowers and fruits: Cockerell, 11e  
 Forest, fossil, Jackson Co., Kans.: Shattuck, 05; Tertiary, in California: Marsh, 71a; Yellowstone National Park: Knowlton, 14b  
 Forest fire, fossil: Hollick, 06c  
 Fort Union group: Ward (L F), 89a  
 Fossil floras and glacial periods: Dawson (J W), 77h  
 Fossilization in Paleozoic lycopods: Kindle, 13a  
 Fox Hills flora: Knowlton, 16  
*Frenelopsis ramosissima*, epidermal characters: Berry, 10l  
 Fruit or nut, supposed, Tertiary, Alaska: Thomas (A O), 17a  
 Fucoids: James (J F), 90f  
     Coal Measures: Broadhead, 71a; Lesquereux, 69  
     New York: Harlan, 32; Hollick, 10b  
     Pennsylvania: Harlan, 31a; Mifflin Co.: Taylor (R C), 34  
 Fungi: Berry, 16l; James (J F), 93b  
     Coal Measures, Beaver Co., Pa.: Lesquereux, 78e; Ohio: Herzer, 93a  
     Cretaceous: Whitford, 16a  
     Pliocene, Nebraska: Whitford, 14

## Paleobotany—Continued.

- Fungi: Silurian, New York: Loomis, 00a  
     supposed: James (J F), 85b  
*Geinitzia gracillima*: Jeffrey, 11  
 General: Berry, 04b, 06c; Bureau, 03; Dawson (J W), 69f, 70, 71f, g, 88, 93e, 94h; Harlan, 35e; Hollick, 18; Knowlton, 03, 12; Lesquereux, 60a, 63, 68b, 75a, 76, 81, 87a, 88a; Newberry, 60; Teschemacher, 46; Ward (L F), 83, 84a, 85b, 93a; Yates, 87  
 Genesis and migrations of plants: Dawson (J W), 79a  
 Geographic distribution: Ward (L F), 89  
 Geologic history of North American flora: Newberry, 80; of plants: Dawson (J W), 88  
 Georgia, Mesozoic flora: Berry, 10b  
*Gigantopteris*: White (D), 12  
 Grass, Miocene, Florissant: Brues, 08b  
 Grasses and sedges: Berry, 05d  
 Greenland: Heer, 62, 80, 83, 93; Scott (R H), 72  
     Carboniferous: Heer, 74b; Nathorst, 11  
     Cretaceous: Heer, 71, 74  
     Disco region: Brown (R), 75  
     eastern: Heer, 74c  
     Miocene: Brown (R), 68; Heer, 69a, 70, 70a, 73, 74a  
     west coast: White (D), 98a  
 Ginkgo tree: Ward (L F), 85d  
*Glenopteris*, Permian, Dickinson Co., Kans.: Sellards, 00a  
*Goniopteris claborniana*, Eocene: Berry, 17b  
 Green River group: Lesquereux, 83  
 Grinnell Land: Heer, 79  
 Gymnosperms, geologic history: Berry, 16k; Coulter, 12  
     North America: Penhallow, 07  
     Paleozoic: Dawson (J W), 89h, 90a  
 Hell Creek beds, Montana: Brown (B), 07  
 Herbaceous plants, evolution: Sinnott, 15, 16b  
 Historical review, North American flora: Lesquereux, 75a  
 History, etc.: Ward (L F), 85, 85c, e  
 Honduras, Rhaetic plants: Newberry, 88a, h  
 Horton flora, Carboniferous, Nova Scotia: White (D), 13a  
 Idaho, oak wood, Pliocene: Schuster, 08; Payette flora: Knowlton, 98b  
*Idiophyllum* (=Neuropteris), Mazon Creek: Sellards, 02a  
*Ilex*, new names in: Cockerell, 11f  
 Illinois, Carboniferous: Lesquereux, 66a, 70  
     Coal Measures: White (D), 07a  
     Mazon Creek plants: Peola, 08; ferns: Sellards, 02  
     Mississippian: Worthen, 60b  
     postglacial, trees: Penhallow, 92  
 Indiana, black slate: Duden, 97  
     Bloomington quadrangle, Carboniferous: Jackson (T F), 15  
     Carboniferous: Lesquereux, 84; marine: Lesquereux, 76e  
     New Harmony, fossil trees: Owen (D D'), 43b  
     Orange Co.: White (D), 96  
     Posey Co.: Owen (D D'), 43a  
 Interglacial plants: Penhallow, 94  
 Interglacial wood, Muir Glacier: Knowlton, 95c  
 International boundary: Penhallow, 07d



**Paleobotany—Continued.**

- Iowa, Carboniferous: MacBride, 96; *Lepidostrobus*: Coulter, 11  
 Judith River beds: Knowlton, 05  
 Jurassic flora: Ward (L F), 00  
   Alaska: Knowlton, 14; Matanuska Valley: Knowlton, 16c  
   Greenland: Hartz, 96  
 Kalymma, Moreland, Ky.: Dawson (J W) 91c  
 Kanawha series plants: White (D), 00a  
 Kansas, Belvidere: Knowlton, 95b  
   Carboniferous: Crevecoeur, 03; White (D), 03  
   Cretaceous: Cragin, 89; Hollick, 03b  
   Dakota beds: Hollick, 95, 03a  
   Loup Fork: Cragin, 91a  
   upper Paleozoic plants: Sellards, 08f  
 Kentucky: Lesquereux, 61a  
   Coal Measures: Lesquereux, 57  
   Columbus: Lesquereux, 59  
   Mississippi Bluffs, Pleistocene: Berry, 15b  
   Waverly: Scott (D H), 14  
 Kootanie plants, Great Falls coal field, Mont.: Knowlton, 07  
 Lacoe collection: Goode, 96  
 Lafayette formation: Berry, 11h  
 Land plants, Paleozoic: Lesquereux, 78d; so-called, Ordovician; Newberry, 74f  
 Laramie flora: Lesquereux, 83, 87b; Ward (L F), 85a, 87; White (C A.), 83 p  
   Alberta: Dawson (J W), 87a  
   western Canada: Dawson (J W), 86e  
 Larix, Manitoba: Penhallow, 92a  
 Leafrafts and fossil leaves: Berry, 06  
 Leaf variations: Penhallow, 05  
 Leaves: Humphreys, 14  
 Lebeophyllum, Tertiary, British Columbia: Wilson (W J), 13  
 Lepidodendron (?), New Jersey: Fairchild, 81  
 Lepidodendron, structure: Fairchild, 77  
 Lepidophloios: Dawson (J W), 97a  
 Lepidophloios cliftonensis: Dawson (J W), 98  
 Lepidostrobus, American: Coulter, 11  
   New Brunswick: Wilson (W J), 13a  
   Warren Co., Iowa: Tilton, 12  
 Leptophloeum rhombicum and Lepidodendron gaspianum: Dawson (J W), 73f  
 Lignite fossils, Brandon, Vt.: Hitchcock (E), 53d; Lesquereux, 61; Perkins (G H), 04c  
 Lignite, Lancaster Co., Pa., and eastern Virginia: Rogers (W B), 55a  
 Lignite flora of West: Lesquereux, 68, 74e, 76a, c; age: Newberry, 74j  
 Lignites, Cretaceous, New Jersey: Holden, 14  
 Lignites and plant beds, western America: Newberry, 74e  
 Linden and ash, history: Berry, 18e  
 Liriodendron: Hollick, 95c; Holm, 95  
   Amboy clays, N. J.: Newberry, 87a  
   Cretaceous: Hollick, 94c  
   Laramie, Colorado: Hollick, 94k  
   phylogeny: Berry, 02  
   Triassic, North Carolina: Cobb, 04b  
 Little River group flora: Matthew (G F), 94e, 06  
 Liverwort, Fort Union beds, Montana: Knowlton, 03  
 Locust, geologic history: Berry, 18f

**Paleobotany—Continued.**

- Louisiana, northwestern: Hollick, 99c  
 Lycopod, Devonian: White (D), 07c  
 Lycopodiales, catalog: Jongmans, 13  
 Magothy flora: Berry, 07f, 15a  
 Maine, Perry, Devonian: Dawson (J W), 61g, 62d; Smith (G O), 05; Pleistocene plants, marine clays: Berry, 17c  
 Manitoba, Souris River: Dawson (J W), 80e  
 Maryland, Cretaceous floras: Berry, 10, 14b; Lower Cretaceous, Berry, 11c; Lull, 11  
 Massachusetts: Hitchcock (E), 41  
   Chappaquidick Island: Hollick, 02  
   coal field: Hitchcock (E), 53a  
   East Hampton, Clathropteris: Hitchcock (E), 61c  
   Marthas Vineyard: White (D), 90  
   Worcester: Perry (J H), 85  
 Matawan flora, Cliffwood, N. J.: Berry, 03, 03b, d, 04, 04a, 05  
 Mesozoic and Cenozoic plants: Knowlton, 10a  
 Mesozoic and Tertiary floras, range and succession: Knowlton, 10b  
 Mesozoic dicotyledons: Ward (L F), 84  
 Mesozoic floras: Ward (L F), 05  
   Atlantic Coastal Plain: Berry, 06g, 07b, 09a, 10b, 11j  
   North and South America: Knowlton, 18  
   Rocky Mountain region: Dawson (J W), 86a  
 Mexico: Villada, 03a  
   Liassic plants, Mixteca Alta; Wieland, 13, 14a; Puebla and Vera Cruz: Díaz Lozano, 16  
   Oaxaca; Felix, 93  
 Mid-Cretaceous species of Torreya: Berry, 08  
 Mifflin Co.: Taylor (R C), 34  
 Minnesota, Cretaceous: Lesquereux, 84a, 95  
 Miocene: Lesquereux, 83  
   Arctic regions: Heer, 67b  
   Mackenzie River: Heer, 80a  
   Maryland: Clark (W B), 04a  
   northern Greenland: Heer, 66, 67  
 Miocene cypress swamp: Berry, 08c  
 Miocene trees: Cockerell, 10a  
 Mississippi, Meridian: Berry, 17; petrified logs Brown (C S), 13  
 Missouri, Carboniferous: White (D), 93  
   catalog: Hambach, 90  
   Henry Co.: White (D), 97  
   Pennsylvanian: White (D), 15  
 Monocotyledonous remains, Staten Island, N. Y.: Hollick, 97e  
 Monocraterion: Matthew (G F), 01h  
 Montana, Bozeman coal field: Knowlton, 92, 93a  
   Fort Union beds: Knowlton, 93  
   Great Falls coal field: Fontaine, 93; Newberry, 91  
   Oligocene: Jennings, 18  
   Porcupine Butte: Knowlton, 02c  
 Montana flora: Knowlton, 00  
 Morrison formation: Knowlton, 16g  
 Moss, Seattle, Wash.: Hollick, 98e; Tertiary: Britton (E G), 99  
 Mosses: Britton (E G), 99; Knowlton, 02f; Tertiary, Florissant: Britton (E G), 07  
 Myelopteris, Topeka, Kans.: Penhallow, 97  
 Myristica, Texas: Berry, 16i



## Paleobotany—Continued.

- Myrtaceae, origin and distribution: Berry, 15e  
 Nageiopsis, revision: Berry, 10e  
 Nebraska, Carboniferous: Pepperberg (R V), 10a  
 Cretaceous: Capellini, 66; Heer, 58; Lesquereux, 68a; Meek, 58c  
 nuts: Barbour, 98b; Knowlton, 01b  
 plant tissue, Carboniferous: Barbour, 14f  
 Nelumbo, Laramie beds, Florence, Colo.: Hollick, 94b  
 Nematophyton: Penhallow, 90; Prosser, 02b  
 Gaspe: Penhallow, 89  
 New York: Penhallow, 93a; Waterlime, Buffalo: Penhallow, 96a  
 Nematophyton ortonii: Penhallow, 96b  
 Neocalamites, restoration: Berry, 18b  
 New Brunswick: Holden (R), 13a; Wilson (W J), 18  
 Hillsboro: Jackson, 52a  
 Lancaster, fern ledges, flora: Hartt, 65a  
 Little River group flora: Matthew (G F), 95a, 10b, 11  
 St. John, Carboniferous flora: Stopes, 12, 13, 14  
 Silurian flora: Matthew (G F), 10d, 12a  
 southern: Wilson (W J), 11  
 Newfoundland, Carboniferous plants: Dawson (J W), 91; Psymophyllum majus: Arber, 10, 12  
 New Jersey: Hollick, 99b  
 Bridgeton, Yellow gravel: Hollick, 92, 96  
 Cliffwood: Berry, 03, 03b, d, 04, 04a, 05; Cretaceous Pityoxyla: Holden (R), 13  
 Cretaceous, coniferous wood: Hammond, 58  
 Cretaceous palm: Stevens (N E), 12a  
 Lindenwold tree trunk: Woolman, 97  
 Matawan flora: Berry, 03b  
 Pleistocene flora: Berry, 10d  
 Raritan clay: Conrad, 69  
 New Mexico, San Juan Co., Fruitland and Kirtland formations: Knowlton, 16a; Tertiary: Lesquereux, 72  
 New York, Devonian: Penhallow, 93  
 Kreischerville: Hollick, 86, 07a  
 Lepidodendron: Clarke (J M), 87b  
 Long Island: Britton, 84; Cretaceous: Hollick, 94, 03  
 Orange Co., tree: Nevius, 00  
 Schoharie Co., trees: Hall, 71c  
 Staten Island: Britton (N L), 85; Hollick, 84, 86b, 92c, d, 96f, 98b; amber: Hollick, 05  
 Williamsburgh: Newberry, 71f  
 New York Botanical Garden collection: Hollick, 08c  
 Nipadites, Eocene: Berry, 14e  
 North Carolina: Heer, 57  
 Mesozoic: Berry, 10a; Fontaine, 83, 00  
 Pleistocene: Berry, 09b  
 Triassic wood: Knowlton, 00a  
 North Dakota, Tertiary: Leiberg, 89  
 Northwest Territory, Mackenzie River: Dawson (J W), 90d  
 Nova Scotia: Dawson (J W), 63g  
 Cape Breton Island: Bunbury, 47a  
 Carboniferous: Dawson (J W), 59, 64b  
 Cumberland, fossil trees: Lyell, 43e  
 South Joggins: Dawson (J W), 54

## Paleobotany—Continued.

- Nova Scotia: Sydney coal field: White (D), 13a; Stigmara: Brown (R), 48  
 Ocoee slates: Smith (E A), 03a  
 Ohio: Newberry, 73c  
 Carboniferous: Herzer, 01, 02; Kimball, 57; Newberry, 56a, b, 74w; fossil wood: Claypole, 87b  
 Coal Measures: Andrews (E B), 75; Foster, 53; Newberry, 53a, b, c, d  
 Devonian: Herzer, 02; Newberry, 89d  
 fossil trees: Hildreth, 27  
 Perry Co.: Andrews (E B), 75b  
 Summit Co.: Whittlesey, 49  
 Zanesville: Granger, 21  
 Oklahoma: Berry, 18a; McAlester coal field: White (D), 99a  
 Oldhamia: Walcott, 94c  
 Oligocene plants, Montana: Jennings, 18  
 Omphalophloios: White (D), 98  
 Ontario, Don Valley, Pleistocene: Penhallow, 99, 00a, 05a  
 Hamilton, Silurian: Grant (C C), 92  
 Oregon, Cascade Mountains: Knowlton, 00d  
 John Day Basin: Knowlton, 02  
 Jurassic: Knowlton, 10c  
 Miocene: Newberry, 71e  
 Ordovician land plants: Lesquereux, 74d  
 Ovularites: Whitford, 16a  
 Palaeophycus, Triassic, New Jersey: Lewis, 80m  
 Paleobotanical evidences as to geologic climate: White (D), 10b  
 Paleobotany, 1890-1900: Penhallow, 01  
 Paleohillia: Holm, 96; Cretaceous, Arkansas: Knowlton, 95a  
 Paleozoic: Lesquereux, 87  
 eastern North America: Dawson (J W), 65d  
 northeastern America: Dawson (J W), 65e  
 Paleozoic botany, present position: Scott (D H), 08  
 Paleozoic flora: White (D), 09a  
 Paleozoic land floras: Dawson (J W), 84b  
 Paleozoic Plantae, catalog: Lacoe, 84  
 Paleozoic seed plants: Berry, 04c  
 Palm, Cretaceous, New Jersey: Berry, 16h  
 Palmoxylon, Louisiana: Knowlton, 88b  
 Panama Canal Zone: Berry, 14h, 18  
 Pecopteris, St. John, N. B.: Dawson (J W), 81g  
 Pennsylvania: Lesquereux, 58, 58a  
 Beaver Co., Trigonocarpum: King (A T), 54b  
 Carbondale: Teschemacher, 47  
 Carboniferous: Kimball, 57; Lesquereux, 54, 80  
 Dauphin Co.: Taylor (R C), 43, 46a  
 Devonian: Penhallow, 93  
 Johnstown region: Harlan, 35  
 Mansfield, ferns: Teschemacher, 43a  
 Mauch Chunk: Göppert, 39  
 Permian: Fontaine, 80  
 Rhizomorpha: Lesquereux, 78e  
 roof of Pittsburgh coal: Grier, 14  
 southern anthracite coal field: Unger, 07  
 Triassic cycads and conifers: Brown (A P), 11  
 Westmoreland Co.: King (A T), 54a  
 Pennsylvanian, Indiana: Jackson (T F), 17  
 Permian, Kansas: Sellards, 00, 01a; western "red beds": White (D), 10a



**Paleobotany—Continued.**

- Persimmon, ancestry: Berry, 12g  
 Phragmites, Staten Island, N. Y.: Hollick, 97  
 Phylogeny and taxonomy: Coulter, 12a  
 Phytogeographic survey of North America: Harshberger, 11  
 Pinoxylon, Black Hills: Knowlton, 00c  
 Pinus lindgrenii, Snake River valley, Idaho: Knowlton, 01a, 02e  
 Pityoxylon: Knowlton, 97; Thomson (R B), 12  
   Cretaceous: Bailey (I W), 11; Jeffrey, 06  
   Gallatin basin, Mont.: Knowlton, 96d  
 Plagiopodopsis, Florissant: Britton (E G), 15  
 Plagiozamites, Coal Measures, Garrett Co., Md.: Bassler (H), 16  
 Plant cuticles, Graneros shale: Whitford, 16  
 Plant remains in basalt, Mexico: Solórzano, 07  
 Platanus, geologic history: Berry, 14g; Ward (L F), 88a  
 Pleistocene, Alabama: Berry, 07d, 10h  
   Canada: Penhallow, 07a  
   Maryland: Hollick, 06f; Indian Head: Berry, 15f  
   New Jersey: Berry, 10d  
   North Carolina: Berry, 07c  
   Southern States: Berry, 14d  
   Virginia: Berry, 06h  
 Polypore, West Virginia: Hollick, 10a  
 Post-Pliocene, Canada: Dawson (J W), 66c  
 Potomac flora: Feistmantel, 89; Fontaine, 89; Ward (L F), 88, 95; fossil wood and lignites: Knowlton, 89a; revision: Berry, 10f, 11f, g  
 Pottsville floras, Pennsylvania: White (D), 00  
 Pre-Carboniferous flora, New Brunswick, Maine, and eastern Canada: Dawson (J W), 61c  
 Prehistoric tree, Oswego, Oreg.: Nye, 84  
 Preissites, lower Yellowstone, Mont.: Knowlton, 94a  
 Prepinus, Marthas Vineyard: Jeffrey, 10a  
 Preservation of vegetable remains: James (J F), 92a; Lesquereux, 71a  
 Primeval flora: Dawson (J W), 69f, 97  
 Prince Edward Island: Bain (F), 80; Dawson (J W), 71; Holden (R), 13a; coniferous wood: Dawson (J W), 54b  
 Protophyllocladus: Berry, 03a  
 Protophyllocladus subintegrifolius, stomata: Berry, 07g  
 Prototaxites, Gaspé: Dawson (J W), 73c  
 Psaronius: Herzer, 97  
   Devonian, New York: Hall, 72d, e  
   Iowa: Farr, 14  
 Psymphyllum majus, Newfoundland: Arber, 10  
 Pteridospermaphyta: Ward (L F), 04  
 Ptilophyton: Dawson (J W), 82c  
 Puccinites: Whitford, 16a  
 Quebec, Gaspé: Dawson (J W), 57c, 60g, 69e, 89a; White (D), 13a  
 Quercus hatcheri: Knowlton, 06a  
 Raritan flora: Berry, 10j, 11, 15a  
 Relations to botany: Hollick, 12; to morphology: Jeffrey, 12a; to phylogeny: Penhallow, 10  
 Resins in Paleozoic plants: White (D), 14

**Paleobotany—Continued.**

- Rhaetic flora of Moncure shales: Cobb, 06c  
 Rhizocarps, Paleozoic: Dawson (J W), 84d, 86d  
 Rhode Island: Jackson, 40  
   Carboniferous: Lesquereux, 84b; Providence Franklin Soc., 87  
   Coal Measures: Clark (E F), 84; Lesquereux, 89  
 Rhynchostegium, Kittitas Co., Wash.: Britton (E G), 99  
 Rocky Mountain region: Lesquereux, 73b  
 Roots in underclays of coals: White (D), 13b  
 Sabal rigida, Laramie, Wyoming: Hatcher, 01c  
 Salvinia: Hollick, 94a  
 Sambucus: Cockerell, 10g  
 Saskatchewan, Cretaceous: Dawson (J W), 88d; Tertiary: Dawson (J W), 81; Penhallow, 03  
 Sassafras: Berry, 02a  
 Schizaeaceae, lower Cretaceous species: Berry, 11d  
 Seed-bearing ferns: Knowlton, 15a; White (D), 04b  
 Selaginella, northeastern Montana: Knowlton, 16e  
 Sequoia: Knowlton, 01d  
   Florissant: Cockerell, 07m  
   Sierra Nevada: Jeffrey, 04  
 Serenopsis, Cretaceous, Long Island: Hollick, 93c, d  
 Sigillaria, Cape Breton: Dawson (J W), 74d  
   fructification: Dawson (J W), 74d  
   Keokuk limestone, Iowa: Gordon (C H), 90c  
   Pennsylvania: Eaton (A), 31  
   southern Kansas: Walters, 91  
   structure: Dawson (J W), 70; Fairchild, 77; and affinities: Dawson (J W), 70h  
   upright, South Joggins, N. S.: Dawson (J W), 61; Sydney coal field, Cape Breton: Brown (R), 49  
 Silicified forest, Colorado: Nicholson, 73e  
 Silicified woods, California: Friedrich, 89  
 Silurian and Devonian, Canada: Matthew (G F), 07a  
 South Dakota, Black Hills: Ward (L F), 94  
 Sphenophyllum: Newberry, 91a  
 Sphenozamites, San Juancito, Honduras: Humphreys (E W), 16  
 Sporangites: Clarke (J M), 85; Dawson (J W), 86d, 92b  
 Spore cases in coals: Dawson (J W), 71e  
 Spores and spore cases, Erian formation: Dawson (J W), 84c  
 Sporocarps in Ohio shale: Orton, 89c  
 Status: Berry, 12h  
 Sternbergia: Dawson (J W), 57d  
 Stigmara: Teschemacher, 52; Nova Scotia: Poole, 02a  
 Stonewort, Jura-Cretaceous: Hannibal, 18  
 Structure of leaf in Cretaceous pines: Jeffrey, 08  
 Swauk series: Duror, 16  
 Taeniopteris, Missouri: White (D), 93a; Permian, Kansas: Sellards, 01  
 Taxodium, Quaternary, North Carolina: Holmes (J A), 85  
 Tennessee, Cretaceous: Berry, 16f; Fayette Co.: Lesquereux, 59



## Paleobotany—Continued.

- Tertiary: Berry, 18d; Cockerell, 10b; Heer, 61; James (J F), 84a; Lesquereux, 60a, 72a<sup>9</sup> 78, 78a, b; Newberry, 60, 68, 69, 98; Penhallow, 06  
 Atlantic and Gulf Coastal Plain: Berry, 11e catalog: Knowlton, 98  
 Kansas and Nebraska: Lesquereux, 71  
 Mississippi: Lesquereux, 69a  
 Texas, Bastrop, petrified wood: Dumble, 89b  
 Caddo Landing: Knowlton, 95  
 Trinity beds: Fontaine, 93a  
 Wichita beds, Permian: White (I C), 92a  
 Thamnocladus, Chemung beds, N. Y.: White (D), 02b  
 Thinnfeldia: Berry, 03a  
 Tilia, New Jersey, Pleistocene: Berry, 07a  
 Trapa: Berry, 14c  
 Tree, fossil, Desplaines River: Schoolcraft, 22b  
 Tree ferns, Devonian: Dawson (J W), 71c  
 Tree stumps, Alberta: Hargreaves, 16  
 Tree trunk, New York Devonian: White (D), 07  
 Tree trunks, coal measures: Gresley, 90; with mastodon remains: Gordon (R), 02a  
 Trees, fossil, upright, Nova Scotia: Bunbury, 46b; Sydney, Cape Breton Island: Brown (R), 46  
 Triassic: Ward (L F), 92, 00  
 Connecticut Valley and New Jersey: Newberry, 87c, 88  
 Honduras: Newberry, 88h  
 New Mexico: Fontaine, 90  
 Pennsylvania: Wherry, 12d, 16b  
 Richmond, Va.: Marcou, 90a  
 Sonora, Mex.: Humphreys (E W), 16a; Newberry, 76a  
 York Co., Pa.: Wanner, 00  
 Triassic cycads and conifers, Pennsylvania: Brown (A P), 11  
 Trigonocarpum, Arkansas: Moss, 50; Cape Breton Island: Dawson (J W), 61a  
 Trinidad: Crüger, 60  
 Types in U. S. National Museum: Merrill (G P), 07e  
 United States: Lesquereux, 80  
 Upper Cretaceous: Berry, 16  
 Use of plants in stratigraphy: Knowlton, 94b  
 Vancouver Island: Newberry, 63  
 Vegetable structure in coal: Dawson (J W), 59b  
 Vegetable tissues in anthracite: Bailey (J W), 46  
 Vermejo and Raton floras: Knowlton, 17  
 Vermont, Brandon: Hitchcock (E), 53a, 57c, 61; Knowlton, 02b; Perkins (G H), 04d  
 Virginia: Fontaine, 79  
 Alleghany Co.: Meek, 80  
 coal fields: Stur, 88  
 Eocene nut: Ruffin, 50  
 Fredericksburg region: Taylor (R C), 35d  
 James River coal field: Bunbury, 47  
 Mesozoic: Fontaine, 83  
 Miocene flora: Berry, 09  
 Neocalamites, Triassic: Berry, 12a  
 Pleistocene, Blue Ridge: Berry, 12d  
 Pleistocene swamp deposits: Berry, 09d  
 Richmond Basin: Knowlton, 99a; Rogers (W B), 43a

## Paleobotany—Continued.

- Walnuts and hickories, geologic history: Berry, 12f  
 Washington: Knowlton, 02a; Newberry, 63  
 Bellingham Bay: Heer, 59; Lesquereux, 59  
 Ellensburg: Knowlton, 93b  
 Skykomish basin: Smith (W S), 16  
 Western States: Lesquereux, 72a; Newberry, 83f  
 Western Tertiary: Lesquereux, 73  
 West Virginia: Millspaugh, 92; White (D), 13a; White (I C), 82c  
 Morgantown, Quaternary: Knowlton, 96c  
 Permian: Fontaine, 80  
 Whittleseya: White (D), 01c; Riversdale formation, Nova Scotia: Ami, 00j  
 Williamsons: Wieland, 11b; Mixteca Alta, Mex.: Wieland, 09b  
 Willows and poplars, history: Berry, 17k  
 Winchellia: Lesquereux, 93  
 Winchellina: Knowlton, 93d; Carboniferous, Ohio: Herzer, 93  
 Wisconsin, Devonian plants: Penhallow, 08  
 Wood, Keokuk, Iowa: Wallace (S J), 78a  
 Potomac formation: Knowlton, 89  
 Texas: Penhallow, 07c  
 Western States: Platen, 08  
 Yellowstone Park: Felix, 96; Platen, 09  
 Wood replaced by calcite: Greenland, 18  
 Wyoming, Clark Fork basin, Tertiary seeds: Cockerell, 14g  
 Cretaceous Gleichenia: Knowlton, 13a  
 Fort Bridger, supposed Jurassic fossils: Veatch (A C), 06a  
 Frontier formation: Knowlton, 17a  
 Hay Creek coal field: Fontaine, 99  
 Tertiary: Lesquereux, 72  
 Yellowstone National Park: Holmes (W H), 79; Knowlton, 98c, 99; Tertiary: Knowlton, 96b  
 Xantholithes propheticus, Fort Union group: Ward (L F), 89a  
 Xeromorphy in Carboniferous period: Dachnowski, 11  
 Zamia, Mississippi: Berry, 16g  
 Zamostrobus: Ward (L F), 84c  
 Paleochemistry of the ocean: Macallum, 04  
 Paleoclimatology.  
 Acadia: Matthew (G F), 93e  
 Alaska: Blackwelder, 18; Tertiary climate: Hollick, 11b  
 Amelioration of climate: Manson, 18; Mather, 18a  
 Ancient climates of west coast: Smith (J P), 10a  
 Arctic regions: Nathorst, 12; Warring, 85, 86  
 Banded glacial slates of Permo-Carboniferous age: Sayles, 16  
 British Columbia: Brock, 10  
 Canada: Croll, 66  
 northwestern: Tyrrell, 10  
 post-Pliocene: Dawson (J W), 60c  
 Carboniferous: Barrell, 07a; Woodworth, 12  
 Climatic changes: Chamberlin (T C), 97a; Huntington, 13; Russell (I C), 92c  
 Quaternary in maritime provinces: Matthew (G F), 10  
 postglacial: Dall, 10



**Paleoclimatology—Continued.**

- Climatic conditions at Nome, Alaska, during the Pliocene: Dall, 07c  
 Climatic variations; extent and causes: Gregory (J W), 07  
 Cretaceous: Bibbins, 07  
 Delta deposits: Barrell, 12a  
 Devonian: Barrell, 16; Clarke (J M), 18b  
 Devonian climatic zones: Matthew (G F), 12  
 Eocene conditions in Georgia: Berry, 10k  
 Evolution of climates: Manson, 99a, 03; Winchell (N H), 04  
 General: Babbitt, 09; Barrell, 08a, 14b; Beck, 43c; Bereman, 91; Burckhardt, 11b; Bustamante, 06a; Dana (J D), 43b; Dawson (J W), 94h; Forry, 43; Frech, 07, 07a; Gilbert, 83; Gregory (J W), 97; Hunt, 78c; Huntington, 14, 18; Le Conte, 78c; Lee (C A), 43; Lull, 18a; Lyell, 51a; McGee, 81c; Manson, 91, 99, 03, 04, 07, 13; Matthew (W D), 15b; Rogers (H D), 43d; Schuchert, 13a, 14b, 18, 18d; Taber (C A M), 07, 10; Warring, 76, 85; Whitney, 80a; Woeikof, 86  
 Geologic climates: Schaeberle, 08a; influenced by possible reversal of deep-sea circulation: Chamberlin (T C), 06  
 Glacial anticyclone: Hobbs, 15  
 Glacial climate: Dawson (G M), 95f; Hopkins (T C), 03; Upham, 95f; cause: Dutton, 80a; Hilgard, 07; Kemp, 00d; McGee, 83a  
 Glacial period: Dana (J D), 75a; Shaler, 90c  
 Glacial periods: Coleman, 08a; David, 07; cause: Manson, 92  
 Greenland: Jensen, 09  
 Herbaceous plants, evolution: Sinnott, 15  
 Interglacial climate: Leverett, 90  
 Jurassic: Burckhardt, 07a; Ortmann, 96  
 Keewatin conditions: Coleman, 11  
 Lacustral record of past climates: Keyes, 18  
 Lithologic evidence of climatic pulsations: Vail, 17  
 Manson's theory of geological climates: Reid (H F), 09  
 Martinez Eocene time, climatic zones: Dickerson, 17b  
 Massachusetts: Sears, 08  
 Mesozoic and Tertiary: Knowlton, 10b  
 Mountain elevation, effect on temperature: Wallace (S J), 81  
 Oceanic circulation, influence on climate: Chamberlin (T C), 06  
 Oligocene, Washington: Dickerson, 17a  
 Ontario, climatic changes: Coleman, 10  
 Pacific coast: Smith (J P), 16b  
 Paleobotanical evidence: Bailey (I W), 15; White (D), 10b  
 Paleontologic evidences of climate: Stanton, 10  
 Paleozoic climate: Hunt, 63; White (D), 09a  
 Permo-Carboniferous: Case, 15  
 Pleistocene: Dawson (J W), 90; Hollick, 15; Hungerford, 68a; Salisbury, 09; Upham, 93n, 94h  
 Polar climates: Davis (W M), 10b  
 Postglacial climatic changes in Yukon: McConnell, 10

**Paleoclimatology—Continued.**

- Post-Pliocene, Canada: Dawson (J W), 66c  
 Pre-Bonneville climate: Gilbert, 83a  
 Pre-Cambrian: Coleman, 15d  
 Quaternary: Alden, 10; Hay (O P), 10; Knowlton, 10; Huntington, 07  
 Quebec, postglacial climatic changes: Dresser, 10  
 Red beds, origin: Baker (C L), 16  
 St. Lawrence Valley, climatic variations in: Adams (F D), 10c  
 Saliferous deposits, climatic indications: Shaler, 90d  
 Salt deposits: Rogers (H D), 51b  
 Seasons, Permo-Carboniferous: Sayles, 16  
 Sedimentary rocks, origin and age: Schaeberle, 08b  
 Silurian-Devonian: Barrell, 16a  
 Solar hypothesis of climatic changes: Huntington, 14a  
 Upper Devonian: Barrell, 13a  
 Volcanic dust veils: Arctowski, 15; Humphreys, 13  
 Paleo-ecology: Clements, 18  
 Paleometeorology. *See* Paleoclimatology.  
 Paleogeographic maps.  
 Alberta, Cretaceous: Dowling, 15e  
 Appalachian geosyncline, close of Chemung: Barrell, 14  
 Arizona and southern California in post-Pliocene: Blake (W P), 08c  
 California, Tertiary: Dickerson, 16  
 Cambrian: Walcott, 91a, 15; Willis, 00; lower: Walcott, 91; upper: Walcott, 86a  
 Carboniferous: Gordon (C H), 90b  
 Chester sea: Ulrich, 17  
 Cretaceous, Alberta: Dowling, 15e  
 Cretaceous and Tertiary: Baker (H B), 13  
 Devonian: Schuchert, 03c, 13; Weller, 95; Williams (H S), 97; Willis, 00  
 close: Barrell, 13a  
 Columbus time: Stauffer, 09  
 Delaware-Olentangy time: Stauffer, 09  
 General: Pirsson, 15; Cleland, 06; Matthew (G F), 08; Scharff, 11  
 Glacial periods: Schuchert, 14b  
 Jurassic: Lull, 10a; North America: Dacqué, 11  
 Lake Superior region: Winchell (N H), 97d  
 Medina-Cataract-Brassfield: Schuchert, 14a  
 Mesozoic: Schuchert, 16  
 Mexico, Chiapas and Tabasco: Böse, 05  
 Mississippi Valley, upper: Mead (D W), 94  
 North America: Schuchert, 10; Cambrian to Quaternary: Willis, 09; Silurian and Ordovician: Grabau, 12e  
 Ordovician, interior: Chamberlin (T C), 82c  
 Ordovician, Silurian, and Devonian: Grabau, 09a  
 Pacific coast region, Cretaceous: Diller, 15a  
 Pacific Coast Tertiary: Arnold, 09b  
 Paleozoic: Bassler, 11  
 Paleozoic barriers: Ulrich, 02  
 Permo-Carboniferous: Case, 15  
 Silurian: Weller, 98d  
 Taconic: Marcou, 90c  
 Tertiary: Berry, 11e; Osborn, 10; Scott (W B), 13  
 Triassic: Lull, 10a  
 Tully time: Grabau, 17



**Paleogeography.** *See also* Geologic history; Paleoclimatology; Paleogeographic maps.

- Acadian trough: Bailey (L W), 97  
 Adirondacks, pre-Cambrian topography: Kemp, 96f  
 Alberta, Cretaceous: Dowling, 15e  
 Alexandrian series: Keyes, 14  
 Antillean region: Spencer (J W), 94  
 Appalachia: Claypole, 87a  
 Arctic regions: Meyer (O E), 11  
 Bay of Fundy trough: Bailey (L W), 97  
 Biologic principles: Knowlton, 10c; Schuchert, 10b  
 Brachiopoda, significance for paleogeography: Schuchert, 11  
 Bryozoa, Paleozoic, bearing on paleogeography: Ulrich, 11  
 California: Smith (J P), 10; Tertiary: Clark (B L), 18a  
 Cambrian: Matthew (G F), 16; Peach, 12; Walcott, 91a, 09, 15  
 Cambrian and Ordovician: Ulrich, 10a  
 Canada, Paleozoic: Kindle, 15  
 Carboniferous: Girty, 09; Smith (J P), 96  
 Champlain basin in Ordovician time: Ruedemann, 07  
 Chester series: Ulrich, 17  
 Cincinnati axis: Shaler, 87a  
 Cincinnati Silurian island: Miller (A M), 98  
 Circumcontinental growth: Chamberlin (T C), 13  
 Climate and evolution: Matthew (W D), 11e  
 Colorado, Rocky Mountains: Hills, 91c  
 Continental outlines in Tertiary time: Matthew (W D), 06a  
 Cretaceous, Alberta: Dowling, 15e; Rocky Mountain region: Lee (W T), 14, 15a  
 Criteria of continental deposits: Kindle, 11c  
 Cuba: Spencer (J W), 10d  
 Current deposition in continental seas: Bassler, 11g; Ulrich, 11b; Willis, 11a  
 Current ripples as indicators: Bucher, 17  
 Currents in Ordovician, New York: Ruedemann, 97a  
 Detroit River area: Nattress, 10  
 Devonian: Barrell, 14; Clarke (J M), 04, 10c, 15a; Eastman, 08a; Kindle, 11a, 12, 13b; Matthew (G F), 12; Savage, 10c; Schuchert, 03c, 10b, 13d; Weller, 95; Williams (H S), 88b, 90b, 97, 10a  
 Appalachian region: Swartz, 13  
 early: Clarke (J M), 09a  
 eastern North America: Clarke (J M), 07, 08b  
 Ohio basin: Claypole, 03  
 upper: Grabau, 15  
 Devonian and Mississippian faunas: Weller, 09a  
 Devonian corals, migration: Grabau, 16a  
 Early vertebrate faunas: Williston, 09a  
 Evolution of provincial faunas: Chamberlin (T C), 98b  
 Faunal criteria: Bassler, 11e  
 Floral evidence in marine strata: White (D), 11  
 Fossils of dolomites, indications: Weller, 11  
 General: Branner, 97b; Clarke (J M), 11d; Dana (J D), 90a; Grabau, 13e, 14; Lull, 18a; Matthew (W D), 15b; Ortman, 02; Rogers (H D), 50a; Ruedemann, 11; Scharff, 11; Schuchert, 13d, 16b, 18; Smith (J P), 12c; Ulrich, 11a

**Paleogeography—Continued.**

- Geologic periods, delimitation: Schuchert, 13d  
 Geosyncline, western interior: Van Tuyl, 17  
 Glacial period, Great Lakes region: Goldthwait, 08  
 Graptolites, distribution: Ruedemann, 11  
 Great Lakes, pre-glacial formation: Claypole, 79  
 Hatteras axis: Glenn, 99  
 Jurassic: Lull, 10a; Logan, 00  
 Louisiana: Veatch (A C), 06e, g  
 Marine faunal barriers: Dall, 11a  
 Maryland, Paleozoic: Willis, 00  
 Materials of the Appalachians: Claypole, 85d  
 Mesozoic: Schuchert, 16; North America: Stanton, 09  
 Michigan: Lane, 09a  
 Mid-Ordovician time, Mississippi Valley: Berkey, 05d  
 Mississippi embayment: Branner, 97b  
 Mississippi Valley in St. Peter time: Berkey, 06  
 Mississippian: Weller, 98c  
 Missouri: Branson, 18a  
 Montana, Cretaceous: Thom, 17  
 New Brunswick: Matthew (G F), 08  
 New England: Cleland, 06  
 New Jersey, Newark formation: Fenner, 08  
 New York: Clarke (J M), 09  
 Clinton time: Newland, 08a  
 Schoharie Valley: Grabau, 06  
 southern Adirondacks: Miller (W J), 13  
 North America: Hunt, 74a; Schuchert, 09, 10; Suess, 11; Ulrich, 11a; Willis, 10a  
 Oceanic current, Utica epoch: Ruedemann, 98a  
 Ohio, Carboniferous: Hyde, 11a; Cushing, 15  
 Onondaga sea in Allegheny region: Kindle, 11  
 Ontario dome, influence on Tertiary drainage: Grabau, 18d  
 Ordovician: Foerste, 95, 09e, 12b; Grabau, 13b; Raymond (P E), 16b; Ulrich, 09; Willis, 08b  
 Ordovician, Silurian, and early Devonian: Grabau, 09a  
 Oriskany-Pic d'Aurore episode: Clarke (J M), 15b  
 Ostracoda, stratigraphic significance: Bassler, 11f  
 Pacific region: Smith (J P), 94, 95  
 Paleogeographical studies: Willis, 08b  
 Paleozoic: Rogers (H D), 57b; Ruedemann, 08, 10; Ulrich, 11a  
 Arctic regions: Frech, 12  
 eastern North America: Newberry, 86e  
 Paleozoic coral reefs, physical conditions under which formed: Vaughan, 11  
 Paleozoic seas and barriers: Ulrich, 02  
 Panama straits, ancient: Dickerson, 17c  
 Pennsylvania, Mississippian: Chance, 80a  
 Permo-Carboniferous: Case, 15; deposition conditions: Case, 18, 18b  
 Portals, ancient: Smith (J P), 12c  
 Preglacial geography of Great Lakes region: Claypole, 77  
 Primeval continent: Gratacap, 81  
 Principles controlling restorations: Willis, 09  
 Principles of paleogeography: Willis, 10  
 Quebec, Gaspé Peninsula: Clarke (J M), 13d  
 Richmond group: Foerste, 09e



**Paleogeography—Continued.**

- Rocky Mountains: Emmons (S F), 90; southern, Mesozoic: Lee (W T), 18
- St. Lawrence-Champlain-Appalachian fault: Ami, 02i
- St. Peter sandstone: Berkey, 05c
- Shelf seas: Chamberlin (T C), 13b
- Sherburne bar, significance in Devonian stratigraphy: Grabau, 18a
- Shores, ancient, evidences of: Willis, 96a
- Silurian: Grabau, 13b; Schuchert, 14a; Weller, 98d
- Alexandrian series: Keyes, 14
- Arisaig series: McLearn, 18a
- Canada: Savage, 18a
- Monroe time: Grabau, 10
- western America: Kindle, 08
- Tennessee: Bassler, 11d
- Tertiary: Berry, 11e; Ihering, 11; Matthew (W D), 04d, 05d, 06a; Osborn, 10, 12g; Scott (W B), 13; Vaughan, 17; Eocene: Harris, 18
- Tertiary floras: Berry, 18d
- Triassic: Eastman, 11; Lull, 10a
- Trinidad: Guppy, 92
- Washington, Oligocene: Weaver, 18
- West Indies: Spencer (J W), 10d; Trelease, 18
- Paleontology (general). *See also the classes of animals and Paleobotany. For regional see the names of States. See also Evolution; Problematic organisms; Restorations.*
- Adaptive radiation: Osborn, 10b
- Air breathers, earliest: Anon, 85a
- Algae as correlation fossils: James (J F), 94a
- Alternation of fossil faunas: Keyes, 06i
- American Museum Natural History, paleontological collections: Hovey, 02a
- American paleontology and Neo-Lamarckism: Case, 09a
- American Paleozoic fossils, catalog: Miller (S A), 77, 89
- Amphibia, methods of study: Moodie, 15
- Anatomy and physiology in invertebrate extinct organisms: Ruedemann, 10a
- Aqueous habitats: O'Connell, 15
- Arrested evolution: Ruedemann, 18
- Arthropycus and Daedalus, burrow origin: Sarle, 05
- Base leveling and organic evolution: Woodworth, 94
- Bibliography: Marcou (J B), 88, 89; 1887-88: Williams (H S), 90a; 1888-92: Keyes, 94b
- Biogenetic law: Smith (J P), 00
- Biologic evolution: Ward (L F), 90b
- Biologic principles of paleogeography: Knowlton, 10c; Schuchert, 10b
- Birthplace of man: Williston, 10d
- Bottom control of marine faunas: Kindle, 16a
- Catalog: Orbigny, 49; of types: Whitfield, 99
- Cambrian Brachiopoda, habitat: Burling, 13
- Cambrian fauna, origin: Matthew (G F), 12b
- Cambrian faunas, evolution: Walcott, 09
- Casts of fossils, catalog: Ward (H A), 66, 70, 70a
- Caustic potash in cleaning fossils: Böse, 07b
- Century of progress: Weller, 99b

**Paleontology—Continued.**

- Chalcedonized fossils: James (J F), 87c
- Collecting and preparing fossils: Schuchert, 95
- Collecting fossils: Hudson, 16a; Kindle, 16d; in the Cincinnati shales: Dickhaut, 99
- Collections, American Museum of Natural History: Hovey, 00c
- arrangement: Schuchert, 96a
- Gurley collection: Weller, 00f
- Hall collection: Gratacap, 00a
- Lacoe collection, catalog: Welter, 00
- "Colonies" of Barrande: Nicholson, 71
- Coloration in Gastropoda: Girty, 12a; Roundy, 14
- Composite generic fundamenta: Clarke (J M), 94d
- Consecutive faunas: Agassiz (L), 60
- Continuity of development: Matthew (W D), 10e; Vaughan, 10d
- Convergent evolution: Gregory (W K), 14a
- Coral reefs, Paleozoic: Grabau, 03a
- Correlation by faunas: Williams (H S), 03
- Correlation by paleontology, principles: Smith (J P), 00a
- Correlation problems: Williams (H S), 13b
- Criteria for determining time relations: Matthew (W D), 15i
- Dependent life, beginnings: Clarke (J M), 08a
- Devonian and Mississippian faunas: Weller, 09a
- Devonian faunas: Williams (H S), 10b
- Diatomaceae, disintegrating: Bailey (J W), 56
- Disease in extinction of races: Moodie, 17a
- Dwarf faunas: Shimer, 08
- Earlier forms of life: Hitchcock (C H), 77f
- Early life: Morris (C), 85, 85a
- Early surroundings of life: Lane, 07c
- Elementary: Ansted, 47; Dawson (J W), 80a
- Embryology and vertebrate paleontology: Lull, 10
- Eryops and origin of limbs: Gregory, 11, 12d, e
- Evolution: Beecher, 01; Osborn, 12
- paleontological evidences: Scott (W B), 17
- provincial faunas: Chamberlin (T C), 98b
- Evolution as it appears to the paleontologist: Osborn, 07c
- Evolution theory: Scott (W B), 17
- Exhibition of fossil vertebrates: Lucas (F A), 96
- Extinction of species: McCreery, 90; Packard (A S), 86c
- First calcareous fossils: Daly (R A), 09
- First fauna: James (J F), 95b
- Florissant, a Miocene Pompeii: Cockerell, 08l
- Footprints and tracks, formation: Brown (A P), 12
- Fossilization: Dale, 79c; Gratacap, 96; White (C A), 79a
- conditions of: Hartzell, 06
- in Paleozoic lycopods: Kindle, 13a
- Fossils, comparative value in determining geological age: Marsh, 99b
- first appearance: Daly (R A), 13
- in drift boulders: Hollick, 08
- of dolomites, indications by: Weller, 11
- value in stratigraphy: Marsh, 98e
- Fresh-water faunas, origin: Gill, 05a
- Fungus, supposed: James (J F), 85b



## Paleontology—Continued.

- General: Bernard, 97; Conrad, 39a; Cope, 75y; Dana (J D), 63d; Gidley, 16; Hall, 52a, 62i, 63k; Heilprin, 01; Hutchinson, 92, 94; Lucas (F A), 01; Marcou, 53; Mather, 18b; Merriam, 10e; Mitchell, 26; Montgomery (T H), 01; Nicholson, 78; Rafinesque, 32; Scharff, 11; Schuchert, 18d; Smiths Inst, 13; Washburne (Carleton W), 16; White (C A), 93; Williams (H S), 95; Woodward (A S), 09
- General speculations: Gratacap, 01b
- Genetics: Gregory (W K), 17a
- Geochemical evidence as to early forms of life: Clarke (F W), 16
- Geographic and physical conditions: Williams (H S), 84e
- Geographic distribution: Hall, 44c
- Geologic succession of organic types: Winchell (A), 58
- Growth and decline stages: Hyatt, 88
- Historical: Marcou, 92
- History and methods of paleontological discovery: Marsh, 79g
- Imperfection of paleontological record: Nicolson, 72c
- Index fossils: Grabau 09f
- Indiana: Thompson (W H), 89
- Interdependence of stratigraphy and paleontology: Sinclair, 10b
- Inter-relation of contemporaneous fossil faunas and floras: White (C A), 87b
- Intracolony acceleration and retardation: Grabau, 10c
- Invertebrates, inorganic constituents: Clarke (F W), 17
- Isolation a development factor: Grabau, 18b
- Isthmus of Panama and animal life of North and South America: Scott (W B), 16
- Laboratory methods in vertebrate paleontology: Hermann, 09
- Life, place of beginning: Winchell (N H), 04a
- Life before fossils: Morris (C), 96
- Limeless ocean of pre-Cambrian time: Daly (R A), 07
- Lingulae, composition: Logan, 54a
- List of genera: Scudder, 82; established by Marsh: Marsh, 80f
- Mammalian migrations between Europe and North America: Matthew (W D), 08b
- Mammals, orders of: Gregory (W K), 10
- Microorganisms of coal: Renault, 99
- Microscopic organisms in clays, New York: Ries, 94d; in Paleozoic rocks: White (M C), 62
- Migration and shifting of Devonian faunas: Williams (H S), 10b
- Migrations of faunas: Smith (J P), 95a
- Mineral silicates in fossils: Hunt, 71d
- Missouri, index fossils: Branson, 18a
- Molds of fossils, taking impressions of: Slocum, 07
- Morphology, contributions from paleontology: Clark (W B), 10
- Mounting of fossils: Hill (F C), 86
- Mutation theory: White (C A), 03
- Nomenclator zoologicus: Scudder, 82

## Paleontology—Continued.

- Nomenclature: Claypole, 74; Cope, 85i; laws of: Matthew (W D), 13a; of types: Burling, 12b
- North American index fossils, invertebrates: Grabau, 09f
- Ontogeny and phylogeny: Hyatt, 97
- Ontogeny in determining phylogeny: Loomis, 10b
- Ordovician (or Cambrian?) brachiopods in quartzite pebbles in Carboniferous conglomerate, Rhode Island: Walcott, 98b
- Ordovician, Silurian, and Devonian faunas: Grabau, 09a
- Organic evolution: Lull, 17
- Origin and evolution of life: Osborn, 17
- Origin and history of life: Dawson (J W), 75a
- Origin of certain unit characters: Osborn, 12b
- Origin of genera: Cope, 68k
- Origin of life: Woodruff, 18
- Origin of oldest fossils: Brooks (W K), 94
- Origin of single characters: Osborn, 15a
- Pacific coast region: Merriam, 15a
- Paleo-ecology: Clements, 18
- Paleontogeny and phylogeny: Smith (J P), 97
- Paleontologic correlation: Matthew (W D), 10c
- Paleontologic evidences of adaptive radiation: Osborn, 10b; of climate: Stanton, 10
- Paleontologic record: Clarke (J M), 10a; adequacy of: Bassler, 10; Calvin, 10a
- Paleontological and embryological development: Agassiz (A), 80
- Paleontology and isolation: Clarke (J M), 10b
- Paleontology and ontogeny: Grabau, 10a
- Paleontology as a morphological discipline: Scott (W B), 96b
- Paleontology of arrested evolution: Ruedemann, 18
- Paleozoic, revised classification: Grabau, 09
- Paleozoic fossils, distribution: Owen (D D), 51b
- Paleozoic genera, variations: James (J F), 89c
- Parasites of oyster: White (C A), 84d; Parasitism: Clarke (J M), 11c
- Pathological conditions in fossils: Moodie, 18
- Pathology and bacteriology, Mesozoic: Moodie, 16c
- Periodic migrations: Smith (J P), 04
- Persistence of fluctuation variations: Williams (H S), 10c
- Photography of fossils: Burling, 11; Van Ingen, 01b; Williams (H S), 01a
- Phylogenesis, relation to historical geology: White (C A), 05a
- Phylogeny and correlation: Matthew (W D), 13
- Phylogeny of an acquired characteristic: Hyatt, 93b, 94
- Pneumatic tools for fossil cleaning: Riggs, 03c
- Popularization: Burling, 14d
- Postglacial fossils: Olsson-Seffer, 03
- Power chisel: Morse, 16b
- Pre-Cambrian ocean: Daly (R A), 12b
- Preservation of invertebrate fossils: White (C A), 79a
- Primitive diversity of animals: Agassiz (L), 54
- Problems of paleontology: Osborn, 05c
- Protoconch, value in classification: Grabau, 12
- Raindrop impressions: Lyell, 51a



**Paleontology—Continued.**

- Recapitulation theory and paleontology: Cummings, 10
- Relation of paleobotany to phylogeny: Penhallow, 10
- Relation of paleontology to the history of man: Merriam, 10c
- Relations to other branches of science: Woodward (A S), 06
- Removing tests from fossils: Buckman (S S), 11
- Reports on paleontological work: Whiteaves, 87
- Ring structures in silica: Stansfield, 18a
- Rise and progress: Huxley, 81
- Rock-boring animals, geologic significance: Barrows, 17
- Rocky Mountain region: Hitchcock (C H), 71c
- Sand blast for cleaning fossils: Osborn, 04l
- Scope of paleontology: Williams (H S), 92
- Sections of Bryozoa: Foerste, 87b; James (J F), 87d, e
- Sedimentary relations, Cambrian and Ordovician Brachiopoda: Burling, 14a
- Shifting of faunas: Williams (H S), 03a
- Silicification of fossils: Bassler, 08; Hayes (A A), 57a; Hunt, 64b
- Similar forms, biological and geologic significance: White (C-A), 91b
- Skiagraphy of fossils: Field, 15a
- Stereograms, use in paleobiology: Hudson (G H), 13
- Stratigraphic work: Schuchert, 13e
- Succession of life: Cope, 74p
- Succession of vertebrate life: Marsh, 91e
- Ten years' progress in vertebrate paleontology: Bassler, 12a
- Tetraplasy: Osborn, 12f
- Textbook: Eastman, 00, 13; Shimer, 14
- Tracks of invertebrates: Dawson (J W), 90b
- Transmission of acquired characters: Osborn, 90
- Trap, fossils in: Honeyman, 74b
- Type fossils in the Peter Redpath Museum: Ardley, 16
- Type material, preservation: Marsh, 99d
- Types: Marsh, 98c; Schuchert, 97b
- American Museum of Natural History: Whitfield, 98
- Boston Society of Natural History: Cushman, 07
- Mesozoic and Cenozoic: Marcou (J B), 85, 86
- New York State Museum: Clarke (J M), 07d
- nomenclature: Schuchert, 05d
- U. S. National Museum: Schuchert, 05; Merrill (G P), 07e
- Types of species, figures and descriptions: Int G Cong, 03
- United States, eastern: Rogers (H D), 35
- Vertebrae, evolution: Williston, 18
- Vertebrate paleontology and the evidences for recapitulation: Hussakof, 10
- Vertebrates, evolutionary evidences: Williston, 12
- Weathering of fossils: Marsh, 68c
- Cambrian.*
- Abrupt appearance of Cambrian fauna: Walcott, 10
- Acadian fauna, age: Matthew (G F), 84
- Alabama: Walcott, 10; Coosa Valley, Medusae: Walcott, 96b

**Paleontology—Continued.***Cambrian—Continued.*

- Alaska, Port Clarence limestone faunas: Kindle, 11d
- Albertella fauna: Burling, 14; Walcott, 17
- Algal reef, Teton Mountains: Blackwelder, 15a
- Annelida, Middle Cambrian: Walcott, 10
- Archaeocyathus: Hinde, 89a
- Arctic regions, Ellesmere Land: Hortedahl, 13
- Asaphidae: Raymond (P E), 12a
- Belt fauna: Rothpletz, 15
- Brachiopoda: Matthew (G F), 02b; Walcott, 97a, 98a, 01, 02b, 05, 08a, 12; habitat: Burling, 13; sedimentary relations: Burling, 14a
- Braintree fauna: Walcott, 84
- Branchiopoda, Malacostraca, Trilobita, and Merostomata: Walcott, 10
- British Columbia: Walcott, 12c
- Field: Ami, 93c; Walcott, 13a
- Kicking Horse Valley: Walcott, 12b
- Mount Bosworth: Burling, 16c
- Mount Stephen: Matthew (G F), 99, 02b; Rominger, 87a, 88; Walcott, 88a, 89, 08; Winwood, 85; Woodward (H), 02; Anomalocaris: Whiteaves, 92b
- Paedeumias: Burling, 16b
- Camerotheca (pteropod), St. John group: Matthew (G F), 85b
- Canada: Whiteaves, 06b; eastern: Matthew: (G F), 01f, 16
- Cape Breton Island: Matthew (G F), 02d, 14
- Catalog of fossils: Bigsby, 68
- Cirripedes: Matthew (G F), 96
- Conocephalites: Bradley, 60
- Descriptions: White (C A), 74
- Dictyonema: Matthew (G F), 91b
- Dictyonema fauna, eastern New York: Ruedemann, 03
- Diffusion and sequence of faunas: Matthew (G F), 91a, 93
- Dikelocephalinae: Walcott, 10
- Discina acadica, St. John group: Matthew (G F), 86a
- Early Paleozoic faunas, evolution of: Walcott, 09
- Eastern Canada, catalog: Matthew (G F), 04c
- Eldonia, restoration: Clarke (A H), 13
- Etcheminian fauna, Cape Breton: Matthew (G F), 99f; Newfoundland: Matthew (G F), 99e; source: Matthew (G F), 02b
- Faunas, origin: Matthew (G F), 12b; succession: Walcott, 91c
- Gastropoda, phylogenic stage: Sardeson, 03
- General: Barrande, 59, 60a, b, 61, 62; Emmons (E), 54; Hall, 62l; Marcou, 62a; Matthew (G F), 96e, 97e, 98c; Schuchert, 15c; Walcott, 84, 86, 15, 16; Anon, 12h
- Graptolites, New Brunswick: Matthew (G F), 95i
- Holothurians: Clark (A H), 13a; and medusae: Walcott, 10
- Hyolithes, St. John group: Hyatt, 85a
- Invertebrata, Montana: Whitfield, 76
- upper Missouri: Meek, 65a
- Western States: White (C A), 77
- Leptoplastus: Matthew (G F), 91c
- Lingulella, New York: Ford (S W), 78a
- Lingulepis: Walcott, 97b



## Paleontology—Continued.

## Cambrian—Continued.

- Lower Cambrian or Olenellus zone: Walcott, 90, 90c  
 Magnesian series: Sardeson, 96b  
 Maine: Hitchcock (C H), 62 b  
 Massachusetts, Boston Basin: Grabau, 98b, 00a  
 Braintree: Hobbs (W E), 99; Ordway, 61a; Shimer, 07, 07a; trilobites: Rogers (W B), 57a  
 Cohasset: Walcott, 92d  
 eastern: Burr, 00; Foerste, 89; Rogers (W B), 56d  
 Essex Co.: Sears, 05  
 North Attleboro: Shaler, 88b  
 Merostomata: Walcott, 10  
 Mesonacis, Vermont: Walcott, 85a  
 Michigan: Winchell (A), 64; Upper Peninsula: Hall, 51c  
 Microdiscus: Matthew (G F), 96b  
 Middle Cambrian: Walcott, 89  
 Minnesota: Winchell (N H), 86a  
 Pipestone: Winchell (N H), 85f  
 St. Croix Dalles: Berkey, 97  
 Missouri, Ozark region: Shumard (B F), 63  
 St. Francois Co.: Beecher, 01a; eurypterid, Beecher, 01b  
 Montana: Meek, 73; Helena region: Rothpletz, 15; Walcott, 14  
 Mount Whyte fauna: Walcott, 17  
 Nevada, Eureka district: Walcott, 84; Whitney, 72a; Pioche Mountains: Pack, 06a  
 New Brunswick: Matthew (G F), 88b, c, 95h, 14  
 basal series: Matthew (G F), 90  
 Kennebecasis Valley: Matthew (G F), 98  
 Ostracoda and Trilobita: Matthew (G F), 06b  
 St. John: Hartt, 65; Matthew (G F), 92a  
 Brachiopoda: Matthew (G F), 95f  
 Hyolithes: Matthew (G F), 01a  
 Leptoplastus: Matthew (G F), 89a  
 Protolenus: Matthew (G F), 92b  
 Trilobita: Matthew (G F), 93b  
 Newfoundland: Billings, 72f, 74; Matthew (G F), 87, 88b, 99a; Whiteaves, 78b  
 Avalon Peninsula: Billings, 82  
 Etcheminian fauna: Matthew (G F), 99e  
 Metadoxides: Matthew (G F), 99c  
 Smith Sound, Etcheminian fauna: Matthew (G F), 99b  
 New Jersey: Weller, 03; trilobites: Weller, 00a  
 New York: Ford (S W), 72; Hall, 47, 73b; Whitfield, 84  
 Dutchess Co.: Dwight, 89  
 Potsdam-Hoyt fauna: Walcott, 10  
 Poughkeepsie, Potsdam: Dwight, 86a  
 Protichnites: Marsh, 69  
 Rensselaer Co.: Ford (S W), 73, 75, 76  
 Stissing: Dwight, 90c  
 Troy: Ford (S W), 73a, 78c; Martin (D S), 73; trilobites: Ford (S W), 77a, 81a  
 Washington Co.: Walcott, 87b, c  
 Nova Scotia: Matthew (G F), 88b  
 Cape Breton: Matthew (G F), 87, 01c, 02a, 03; Acrothyra: Matthew (G F), 01d; Ostracoda: Matthew (G F), 02c  
 Oboloid shells: Matthew (G F), 02b  
 Obolus, Black Hills: Whitfield, 75  
 Oldhamia, Caton's Island, New Brunswick: Matthew (G F), 00b

## Paleontology—Continued.

## Cambrian—Continued.

- Olenellus and other Mesonacidae: Walcott, 08a  
 Olenellus fauna: Matthew (G F), 97c, 12b; Walcott, 89c  
 Olenellus? kjerulfi: Matthew (G F), 86e  
 Olenopsis: Walcott, 10  
 Oryctocephalus reynoldsi, Mount Stephen, B. C.: Reed (F R C), 99  
 Ostracoda: Jones (T R), 02  
 Ozarkian seaweeds and oolites: Wieland, 14  
 Paradoxides, Braintree, Mass.: Rogers (W B), 56c, e  
 ontogeny: Raymond (P E), 14  
 St. John: Matthew (G F), 85c, 87e  
 Paradoxides beds faunas: Matthew (G F), 96a  
 Pennsylvania, Lancaster Co.: Roddy, 09; York Co., Olenellus: Wanner, 01  
 Potsdam fauna, upper Mississippi Valley: Hall, 63j  
 Primordial fauna: Jackson, 61c  
 Protocyathus, New York: Ford (S W), 78  
 Protolenus fauna: Matthew (G F), 95h, 04a  
 Pteropoda: Walcott, 85b; St. John group: Matthew (G F), 85d  
 Quebec: Billings, 56a; Point Levi: Billings, 60e  
 Quebec group: Logan, 61b  
 Rocky Mountains: Hayden, 62a  
 St. Croix region: Owen (D D), 51a  
 St. John fauna: Walcott, 84, 85  
 St. John group, New Brunswick: Matthew (G F), 83, 85a, 86c, 87b, c, 88, 91, 92, 93a, 94, 98a  
 Dictyonema horizon: Matthew (G F), 91b  
 Paradoxides beds: Matthew (G F), 97  
 Scotland and North America, faunas compared: Peach, 12  
 Siphonotreta (Protosiphon), St. John group: Matthew (G F), 97d  
 Solenopleura, New York: Ford (S W), 78  
 South Dakota: Meek, 61d; Black Hills: Whitfield, 80  
 Stenotheca acadica, St. John group: Matthew (G F), 86a  
 Taconic area: Walcott, 88, 88c  
 Taconic fauna: Matthew (G F), 91e  
 Tennessee: Walcott, 10  
 Texas: Shumard (B F), 61  
 Trematobolus: Matthew (G F), 93c  
 Trilobita: Salter, 59a; Walcott, 08a, 14, 16a  
 appendages: Walcott, 17  
 Braintree, Mass.: Barrande, 60; Jackson, 56i  
 Upper Cambrian: Walcott, 90e  
 Vermont: Billings, 61d; St. Albans: Edson, 06a; trilobites: Hall, 59g, k, 60d  
 Wisconsin: Whitfield, 80a, 82a; Winchell (A), 64  
 Potsdam: Bradley, 61  
 St. Croix Dalles: Berkey, 97  
 trilobites: Shumard (B F), 63  
 Wyoming: Meek, 61d  
 Yellowstone National Park: Walcott, 99  
 Carboniferous.  
 Agaricocrinus, Keokuk beds: Gordon (C H), 90  
 Alabama, Plantae, Gadsden: Lesquereux, 88b; Tuscaloosa coal field: Bunbury, 46  
 Alaska: Schuchert, 96; Cape Lisburne region: Girty, 06  
 Alberta, Lake Minnewanka, spiriferoids: Shimer, 13; southern: Dowling, 17



## Paleontology—Continued.

## Carboniferous—Continued.

- Alternation of fossil faunas: Keyes, 06i  
 Ammonoids: Smith (J P), 03  
 Amphibamus, Illinois: Cope, 65  
 Amphibia: Moodie, 09b, d; classification, etc.:  
   Moodie, 09a; coal swamps: Matthew (W D), 11c  
 Amphibian footprints, Mississippian, Virginia:  
   Branson, 10  
 Amsden formation, Wind River Mountains,  
   Wyo.: Branson, 18  
 Appalachian region: Morton, 36  
 Arachnida: Petrunkevitch, 13; Scudder, 90f  
 Arctic Archipelago: Haughton, 59  
 Arctic regions: Etheridge, 78; Haughton, 57,  
   60; Lambe, 10; Salter, 55; Whitfield, 08;  
   König Oscar and Heiberg Land: Tschernyschew, 16  
 Arizona: Newberry, 61  
   Aubrey limestone: Reagan, 04b; and Red  
   Wall limestones: Reagan, 04b, c  
   Bisbee quadrangle: Girty, 04  
   Moorefield fauna: Reagan, 11b  
 Arkansas: Shumard (B F), 53; Williams (H S),  
   95a, 00a  
   Batesville fauna: Girty, 15a  
   Boone chert fauna: Girty, 15b  
   Boone limestones: Girty, 15c  
   Coal Measures, Griffithides: Vogdes, 95a;  
   marine: Smith (J P), 96  
   Fayetteville shale fossils: Girty, 10a  
   Insecta: Harvey (F L), 86a  
   Moorefield shale fauna: Girty, 11  
   Morrow group: Mather, 15  
   northern: Williams (H S), 99a  
   Plantae: Lesquereux, 60  
 Batocrinus: Casseday, 54  
 Bellerophon: Conrad, 44  
 Bibliography, invertebrates: Weller, 98  
 Blastoidea: Meek, 69b; Roemer, 51; Shumard  
   (B F), 58c  
 Bolosaurus, Texas: Broom, 13a  
 Bolosaurus striatus Cope: Case (E C), 07b  
 Brachiopoda: Girty, 04b; Mississippian: Gre-  
   ger, 10  
 British Columbia, Flathead Valley: Salter, 85  
 Bryozoa: Prout, 58, 58a, b, 59, 60; Rominger,  
   66; Ulrich, 90c  
 Burlington crinoid: Rowley, 90  
 Burlington fauna, Mo.: Rowley, 00b  
 California: Meek, 64; Smith (J P), 95; Prod-  
   uctus giganteus: White (C A), 81a  
 Calyptraeidae: Keyes, 90e  
 Canada, eastern: Dawson (J W), 55; Plantae:  
   Dawson (J W), 73; Holden (R), 13a  
 Cape Breton, Ostracoda: Jones (T R), 89b  
 Catalog of fossils: Bigsby, 78  
 Cephalopoda: Miller (S A), 92a; Hyatt, 91  
 Chester group, Pulaski Co., Ky.: Miller (S A),  
   79b  
 Chester series: Ulrich, 17  
 Chonetes: Norwood, 55a  
 Chonetes granulifer, development: Greene (F  
   C), 08a  
 Chouteau fauna, origin: Williams (H S), 96  
 Chouteau fossils: Rowley, 93  
 Coal Measures Amphibia: Moodie, 16

## Paleontology—Continued.

## Carboniferous—Continued.

- Cochliodonts: Branson, 05  
 Cockroaches, Mazon Creek: Scudder, 85g, 90c  
 Coelacanth fish from the Iowa Kinderhook:  
   Eastman, 08  
 Colorado: Cross, 07; Girty, 03; Lykins fauna:  
   Girty, 12  
 Conemaugh and Pottsville faunas, West Vir-  
   ginia: Price (W A), 18  
 Conemaugh fauna: White (I C), 02b  
 Conularia: Calvin, 90  
 Cordilleran region: Hall, 77; Meek, 77  
 Craterophyllum verticillatum: Barbour (E H),  
   11a  
 Crawfordsville, Ind., catalog: Beachler, 89  
 Crinoid fauna, Knobstone formation: Springer,  
   11; Texas-Permian: Weller, 09b  
 Crinoidea: Lyon, 59; Meek, 65g; Miller (S A),  
   90b; Shumard (B F), 57  
   Chester group, Ky.: Wetherby, 79b  
   Keokuk group, Ind.: Miller (S A), 82b  
   Mississippi Valley: Hall, 61e  
   Mississippian: Miller (S A), 96b  
 Crustacea, Nova Scotia: Dawson (J W), 77g  
 Ctenoptychius, Permian, Kansas: Martin  
   (H T), 13a  
 Descriptions of species: Girty, 08a; Hall, 56;  
   Shumard (B F), 63a  
 Diplocaulia, Texas: Moodie, 12  
 Dissorophus from Texas: Williston, 10a  
 Dorycrinus: Roemer, 53  
 Dunkard flora, Permian elements in: White  
   (D), 04a  
 Early vertebrate faunas: Williston, 09a  
 Echini: Jackson (R T), 12  
 Echinodermata: Miller (S S), 90; Mississip-  
   pian: Hambach, 84a  
 Estheriae, Kansas: Jones (T R), 98  
 Faunas, relations: Girty, 05a  
 Fern Glen fauna: Weller, 09, 09c  
 Fish fauna of Albert shales, New Brunswick:  
   Lambe, 09  
 Foraminifera: Spandel, 01  
 Fresh-water shells, Nevada: Walcott, 83f  
 Fusulinidae of North America: Staff, 12  
 General: Agassiz (A), 63d; Marcou, 55g, 58;  
   Mather, 15; Williams (H S), 05; Winchell  
   (A), 59  
 Great Basin region: Meek, 60c  
 Great Plains, northern: Hayden, 62  
 Greenland, flora: Heer, 74b; Nathorst, 11;  
   northeastern, Brachiopoda: Grönwall, 17  
 Guadalupian fauna: Girty, 08, 09a  
 Hydreionocrinus, Coal Measures, Kansas: Wel-  
   ler, 98b  
 Illinois: Hall, 64c; McChesney, 67; White (C A),  
   78e  
   Amphibia: Moodie, 11b  
   Arthropoda: Melander, 03; Packard (A S), 89  
   Bryozoa: Prout, 66a  
   Chicago, Mississippian boulders: Davis (W  
   W), 17  
   Coal Measures: Stevens, 58a  
   Crinoidea: Miller (S A), 96a; Owen (D D),  
   52c; Wachsmuth, 82, 83; Worthen, 82  
   Echinodermata: Worthen, 83c  
   Foraminifera: Bagg, 09a



## Paleontology—Continued.

*Carboniferous*—Continued.

- Illinois: Hamburg: Weller, 06  
 Insecta: Dana (J D), 64a; Scudder, 65b  
 Invertebrata: Meek, 66a, 68, 73a, 75b; Worthen, 83a, 90b  
 Mazon Creek: Cockerell, 17b; Eastman, 02a; Harger, 74; Meek, 65e, 68a  
 Amphibia: Moodie, 10a, 13a  
 cockroach: Scudder, 82e  
 ferns: Sellards, 02  
 insects: Handlirsch, 11  
 Myriapoda: Scudder, 90d  
 plants: Peola, 08  
 Spirorbis: Dawson (J W), 81e  
 Mollusca: Worthen, 83b  
 northern: Shepard, 38  
 Pelecypoda: Worthen, 82a  
 Pisces: Leidy, 57f; Newberry, 66; St. John, 75, 83  
 Plantae: Lesquereux, 66a, 70  
 Salem limestone fauna: Weller, 08a  
 Vermilion Co.: Bradley, 72; Termes: Scudder, 78f  
 Indiana: Greene (G K), 98; Miller (S A), 92, 94b; White (C A), 78e, 82b, 84b  
 Bloomington quadrangle, flora: Jackson (T F), 15  
 Brazil limestone fauna: Greene (F C), 11  
 Coal Measures: Ashley, 99  
 Crawfordsville, Onychaster: Sollas, 13  
 Crinoidea: Lyon, 60, 62  
 Harrison Co.: Collett, 79  
 Insecta: Smith (S I), 71  
 Keokuk group: Beachler, 88  
 marine Plantae: Lesquereux, 76e  
 Pennsylvanian Plantae: Jackson (T F), 17  
 Salem limestone: Cumings, 06  
 southern: Kindle, 99  
 Insecta: Scudder, 85d  
 Canada: Dawson (J W), 67b  
 Permian: Sellards, 06c  
 Invertebrata: Foerste, 88; Gurley (W F E), 83, 84; Hall, 52c; McChesney, 61, 67; Meek, 65j, 66c, 70d, 71, 71f; Norwood, 55b; White (C A), 80, 83f  
 Montana: Whitfield, 76  
 Nevada: Meek, 76e  
 Permian Red Beds of Oklahoma and Texas: Beede, 07  
 upper Missouri: Meek, 65a  
 Western States: White (C A), 77  
 Iowa: Hall, 58; White (C A), 67c, 76a  
 Burlington, "Chemung": White (C A), 62; Chemung fauna: Winchell (A), 63a  
 Crinoidea: Wood (Elvira), 14; White (C A), 63  
 Gastropoda: Keyes, 89f  
 Cephalopoda: Keyes, 96p  
 Coal Measures fauna: Keyes, 88d, 91d, 92i  
 Crinoidea: Owen (D D), 52b, c; Worthen, 82  
 Des Moines: Keyes, 88a, 97  
 Edestus: Hay (O P), 12c  
 Humboldt: Sardeson, 02a  
 Kinderhook fauna: Wachsmuth, 90; Weller (S), 00d, 01a  
 Mississippian, Crinoidea: Hall, 59j  
 Orthoceras: Keyes, 96l  
 southwestern: Smith (G L), 09, 15, 16

## Paleontology—Continued.

*Carboniferous*—Continued.

- Kansas: Adams (G I), 03; Beede, 02, 02b, 16; Meek, 58c, 59b; Shumard (B F), 58b, e  
 Coal Measures: Beede, 99b, 00c, 08, 09b; Rogers (A F), 00e  
 Bryozoa: Rogers (A F), 00b  
 Cyclus: Rogers (A F), 02  
 Pelecypoda: Beede, 99c  
 Pseudomonotis: Beede, 99a  
 cockroaches: Sellards, 08g  
 corals: Beede, 98c  
 Crinoidea: Beede, 00a  
 eastern: Schiel, 55a  
 Florena shale fauna: Greene (F C), 08  
 Hooser: Spandel, 01  
 Invertebrata: Beede, 00; Bennett (J), 96a; Girty, 03a  
 Lawrence: Twenhofel, 14a  
 Myelopteris: Penhallow, 97  
 Neosho River section: Beede, 06b  
 Pennsylvanian vertebrates: Twenhofel, 14b  
 Permian: Beede, 09b; Meek, 64f; Swallow, 58d; Plantae: Sellards, 01a; White (D), 03; Onaga: Crevecoeur, 03; upper Paleozoic: Sellards, 08b  
 Pelecypoda: Worthen, 82a  
 Pisces: Leidy, 59, 73  
 Shawnee Co.: Beede, 98  
 Kansas and Oklahoma: Beede, 09a  
 Kentucky, Bedford fauna: Foerste, 09a  
 Blastoidea: Lyon, 60c  
 central: Kindle, 99  
 Coal Measures: Lesquereux, 57; Mollusca: Cox (E T), 57  
 Crinoidea: Lyon, 60, 62  
 Echinodermata: Lyon, 57b  
 flora: Lesquereux, 61a  
 Kings Mountain: Wetherby, 81a  
 Louisville region: Yandell, 47  
 Pulaski Co., Crinoidea: Wetherby, 81  
 Waverly plants: Scott (D H), 14  
 western, Chester series: Ulrich, 17  
 Keokuk group, Crawfordsville, Ind.: Beachler, 88  
 Kinderhook fauna: Keyes, 97a, b, 00c; Rowley, 89a; Weller, 05d, 06; Burlington: Keyes, 89f; Weller, 00b; Missouri: Keyes, 92d  
 Labyrinthodont, Kansas Coal Measures: Moodie, 11a  
 Land snails, Paleozoic: Dawson (J W), 80f  
 Lepidostrobus: Coulter, 11; Warren Co., Iowa: Tilton, 12  
 Linton fauna, environment: Case, 17  
 Lysorophus, Permian urodele: Williston, 08c  
 Marine fossils, Arkansas coal fields: Girty, 07  
 Marshall fauna: Winchell (A), 62b, 65b, 71b  
 Massachusetts, Brockton: Fuller, 96  
 Narragansett Basin: Packard (A S), 00  
 Plainville, vertebrate footprints: Woodworth, 00  
 Mentor fauna, Kansas: Jones (A W), 05  
 Mexico, Coahuila, Permian: Haack, 14  
 Sonora, Sahuaripa Valley: Gabb, 64b  
 Michigan, Grand Rapids, Mississippian: Strong, 72  
 Marshall and Coldwater beds: Lane, 00a  
 Marshall group: Winchell (A), 62, 62b, 65b 71b,



**Paleontology—Continued.****Carboniferous—Continued.**

- Mississippi Valley: Meek, 60d, f, 61b, 65h, 66d, 69a, c, 70b; Worthen, 84
- Mississippian: Rowley, 00a; Weller, 09a
- Brachiopoda: Weller, 14; loop-bearing: Weller, 11a
- Crinoidea: Meek, 68e
- rhynchonelliform shells, internal characters of: Weller, 10
- western Kentucky: Butts, 17b; Ulrich, 05, 17
- Missouri: Girty, 15d; Rowley, 95, 01; Shumard (B F), 55, 58b; Swallow, 60, 63
- Chouteau limestone, Proetus: Vogdes, 97
- Coal Measures: Norwood, 73; Bryozoa: Rogers (A F), 00b
- Echinodermata: Rowley, 00
- flora: White (D), 93, 99
- Glen Park: Weller, 06
- Kansas City, Crinoidea: Butts (E), 91a, 98; list of fossils: Lykins, 84; Trilobita: Hare, 91
- Kinderhook fauna: Weller, 99
- Louisiana: Keyes, 97f
- Mississippian Crinoidea: Miller (S A), 91
- northeastern: Rowley, 02
- Phelps Co., Mississippian: Bridge, 17
- Pike Co.: Rowley, 08; Burlington: Rowley, 91b; Echinodermata: Rowley, 91c, d
- Pisces: Leidy, 57f
- St. Louis: Owen (D D), 42
- Sedalia, trilobites: Vogdes, 88a, 92a
- Springfield: Weller, 95a
- Mollusca: Conrad, 46; nonmarine: White (C A), 83k; terrestrial: Dawson (J W), 76g
- Montana: Meek, 73
- Invertebrata: Meek, 72a
- southwestern: Douglass, 05a; Blastoida and Brachiopoda: Clark (T H), 17
- starfish: Raymond (P E), 12b
- Naosaurus, Permian, Texas: Osborn, 07b
- Naticopsis: Girty, 12a
- Nebraska: American Bur. Mines, 66; Geinitz, 66; Hall, 52c
- calcsponge: Clarke (J M), 97d
- Carboniferous flora: Pepperberg, 10a
- Cass Co.: Woodruff, 06
- Coal Measures, Bryozoa: Condra, 02, 03
- eastern: Meek, 72
- auripterids: Barbour, 12, 14i
- jellyfish: Barbour, 14h
- Pisces: St. John, 70b
- southeastern: Meek, 67e
- Nevada, Eureka district: Walcott, 84
- New Brunswick: Dawson (J W), 66; Wilson (W J), 10a
- fern ledges, St. John: Hartt, 65a; Stopes, 13, 14
- Pisces, Albert shales: Dawson (J W), 77d; Lambe, 10a
- Newfoundland: Dawson (J W), 83c, 91; Psymophyllum: Arber, 10, 12
- New Mexico: Hall, 56; Keyes, 04g; Newberry, 61, 76a
- Burlington limestone: Springer, 84
- Coal Measures: Herrick, 00
- Guadalupe Mountains: Shumard (B F), 58d, f, 59a
- Invertebrata: White (C A), 81

**Paleontology—Continued.****Carboniferous—Continued.**

- New Mexico: Lake Valley district, Mississippian: Miller (S A), 81f
- Limnoscelis: Williston, 12a
- Manzano group: Girty, 09c
- Permian: Herrick, 00c; reptiles: Williston, 11b
- Permo-Carboniferous vertebrates: Case, 13a
- Sphenacodon: Williston, 16c
- New York, Olean quadrangle: Butts, 03
- Nova Scotia: Ami, 00b; Dawson (J W), 60a, 63, 66, 83c; Salter, 63
- Amphibia: Dawson (J W), 76a
- amphibian footprints: Matthew (G F), 03b
- Articulata: Scudder, 82c
- Bellinurus: Jones (T R), 99
- Brachiopoda: Davidson (T), 63
- Cape Breton Island: Bunbury, 47a; Scudder, 75c, 76c
- Psammodus: Whiteaves, 81c
- Coal Measures: Dawson (J W), 46; Poole, 63
- Dendroperpeton: Dawson (J W), 91a
- Entomostraca: Jones (T R), 84
- Horton flora: White (D), 13a
- Hylonomus: Dawson (J W), 91b
- Joggins section: Bell (R N), 13
- Mollusca: Dawson (J W), 67
- Myriapoda: Scudder, 69, 73
- Naiadites: Dawson (J W), 94d
- Ostracoda: Dawson (J W), 97c
- Pelecypoda: Dawson (J W), 94e
- Phillipsia: Billings, 63e; How, 63a
- Reptilia and land Mollusca: Lyell, 53b
- South Joggins: Dawson (J W), 60f, 62, 82, 92a; footprints: Matthew (G F), 03d
- Sydney coal field flora: White (D), 13a
- Ocoee slates: Smith (E A), 03a
- Ohio: Foster (J W), 51i; Meek, 71e; Whitfield, 91
- Camarophorella from the Waverly: Hyde, 08a
- Coal Measures: Stevens, 58a
- Amphibia: Cope, 75e, 77h, 85g
- Coelacanthus: Newberry, 74m
- Conemaugh fauna: Condit, 09; Mark, 12
- Flint Ridge, Bryozoa: Foerste, 87
- Invertebrata: Meek, 75c
- Licking Co.: Herrick, 87
- Linton: Cope, 73zk
- Maxville limestone fauna: Morse, 11
- Mercer limestone fauna: Mark, 11
- northeastern: Prosser, 12a
- Perry Co.: Andrews (E B), 75b
- Pisces: Newberry, 56d
- Plantae: Andrews (E B), 75; Foster, 53; Herzer, 02; Kimball, 57; Newberry, 53a, b, 73c
- Richmond, Insecta: Scudder, 88
- Sphenodictya: Herzer, 01a
- Summit Co.: Whittlesey, 49
- Waverly group: Herrick, 89; Crinoidea: Hall, 64, 75c
- Oklahoma: Beede, 16; Drake, 97
- Caney shale fauna: Girty, 09b
- Chester group: Snider, 15a
- McAlester coal field: White (D), 99a
- Morrow group: Mather, 15
- Pawhuska, footprints: Jillson, 17
- Permian Vertebrata: Case, 02



## Paleontology—Continued.

## Carboniferous—Continued.

- Oklahoma: Red Beds, Invertebrata: Beede, 02c  
 Wewoka formation fossils: Girty, 11b  
 Omphalophloios: White (D), 98  
 Ostracoda: Ulrich, 90f; American Paleozoic: Ulrich, 06a  
 Ostreidae: White (C A), 84  
 Paleoniscid fish, Permian, South Dakota: Hussakof, 16a  
 Paleozoic, upper, floras: White (D), 09a  
 Park City formation phosphate beds faunas: Girty, 10  
 Pelecypoda: Girty, 04b  
 Pelycosauria: Case (E C), 07a; Matthew (W D), 08c  
 Pennsylvania: Lesquereux, 58a; Millwood, 09; Simpson (G B), 90  
 Allegheny and Conemaugh series faunas: Raymond (P E), 10c, 11  
 Ceratiocaridae: Beecher, 84  
 Coal Measures: Conrad, 35a  
 Dauphin Co., plants: Taylor (R C), 46a  
 Eurypteridae: Hall, 84h  
 flora: Lesquereux, 80  
 Helodus, n. sp.: Eastman, 09  
 Johnstown region, plants: Harlan, 35  
 Mollusca: Lea, 53a  
 Permian flora: Fontaine, 80  
 Pittstown, cockroach: Scudder, 77c  
 Plantae: Kimball, 57; Lesquereux, 54; Teschemacher, 47  
 vertebrates, Pittsburgh: Case, 08b  
 western, footprints: Moore (W D), 73  
 Westmoreland Co., footprints: King (A T), 45, 45a  
 Wilkes-Barre: Claypole, 86  
 Wyoming Valley: Heilprin, 86  
 Pennsylvanian and Permian faunas of Kansas: Beede, 09b  
 Permian fauna: Case, 11a, 16a  
 fishes: Hussakof, 11a  
 floras in western "red beds": White (D), 10a  
 fossils, notes on: Case, 08a  
 insects: Sellards, 06c  
 Kansas: Sternberg, 03c  
 land reptiles: Matthew (W D), 09c  
 Gage Co., Nebr.: Beede, 01  
 Reptilia, with restorations: Case, 08c  
 reptile: Williston, 13  
 Texas: Leuchs, 08; White (C A), 89d, 91;  
 Vertebrata: Cope, 15; Williston, 98d, 10, 10c, 11, 16  
 Permo-Carboniferous ammonoids, Glass Mountains, Tex.: Böse, 17a  
 Permo-Carboniferous vertebrates: Case, 15  
 Pisces: Eastman, 03a; Leidy, 56; Newberry, 89  
 Plantae: Sellards, 08f  
 Arkansas Coal Measures: White (D), 07b  
 Illinois Coal Measures: White (D), 07a  
 Iowa: MacBride, 07  
 Pittsburgh coal, roof of: Grier, 14  
 Plateau province: White (C A), 76  
 Pottsville floras, Pa.: White (D), 00  
 Preoccupied generic names: Cockerell, 05b  
 Prince Edward Island: Bain (F), 85; Dawson (J W), 71

## Paleontology—Continued.

## Carboniferous—Continued.

- Prodromites: Smith (J P), 01  
 Productus: Norwood, 55; St. Louis: Prout, 57  
 Quebec, Magdalen Islands: Beede, 11  
 Red Wall limestone: Reagan, 04b, c  
 Reptiles and Amphibia, Texas Permian: Case, 10a  
 Reptilian remains in Pennsylvanian near Pittsburgh: Raymond (P E), 07a  
 Rhode Island: Packard (A S), 89, 89a; Providence Franklin Soc., 87  
 Coal Measures plants: Lesquereux, 89  
 Insecta: Scudder, 93b  
 Narragansett Basin: Packard (A S), 00  
 Pawtucket, Crustacea: Haynes, 13  
 Rhombopora lepidodendroides: Condra, 03a  
 Ste. Genevieve fauna, Monroe Co., Ill.: Weller, 16a  
 Salem limestone: Cumings, 06  
 Shark related to Edestus: Hay (O P), 07b  
 Sharks: Eastman, 02  
 Spergen Hill fauna: Hall, 83j; Whitfield, 82; Idaho: Meek, 73d  
 Spirifer: Swallow, 66b  
 Spirodomus: Beecher, 86  
 Spongida, Illinois: Ulrich, 90a  
 Straparollus, Iowa: Keyes, 90  
 Taeniopteris, Missouri: White (D), 93a  
 Tennessee: Troost, 40  
 Mississippian: Winchell (A), 69c  
 Tracy City: Brown (C S), 92  
 Tetrapoda, Permian: Williston, 16a  
 Texas: Udden, 14a  
 Broiliellus: Williston, 14b  
 Cephalopoda: Hyatt, 93  
 cockroaches: Cockerell, 12d  
 Fort Belknap: Gabb, 59a  
 Guadalupe Mountains: Shumard (B F), 58d, 59a  
 Permian: Cope, 84j; Girty, 02  
 insects: Sellards, 11  
 reptiles and Amphibia: Case, 10a  
 vertebrate fossils, localities and horizons: Cummins, 08  
 Richthofenia: Böse, 16  
 Wichita beds: White (I C), 92a  
 Young Co., Poikilosakos: Watson (D M S), 17  
 Trematops, Permian: Williston, 09b  
 Trilobites: Vodges, 88  
 Triticites: Girty, 04a  
 Uinta Mountains: White (C A), 76  
 Upper Carboniferous: Girty, 09  
 Upper Mississippi Valley: Owen (D D), 40  
 Utah, Bingham district: Girty, 05  
 eastern: Cross, 07  
 Park City district: Boutwell, 12  
 Thayne limestone fossils: Girty, 10b  
 Vertebrata: Hay (O P), 00  
 Virginia, Alleghany Co.: Meek, 80  
 Washington: Meek, 76b  
 Waverly Bryozoa, Ohio: Ulrich, 88  
 Waverly fauna: Cooper (W F), 88, 90; Herrick, 89, 93  
 Western States: White (C A), 79b, 83d  
 West Virginia: Meek, 71h  
 Ames limestone fossils: Beede, 12  
 Boone Co.: Price (W A), 15a



## Paleontology—Continued.

## Carboniferous—Continued.

West Virginia: Braxton and Clay cos.: Price (W A), 17

Conemaugh fauna: Beede, 13

flora: White (D), 13a

Kanawha Co.: Price (W A), 14

Lewis and Gilmer cos.: Price (W A), 16

polypore: Hollick, 10a

Preston Co.: Price (W A), 14a

Raleigh Co.: Price (W A), 16a

Wewoka fauna, Okla.: Girty, 15

Wyoming, Amsden fauna: Blackwelder, 13

Embar fauna: Blackwelder, 13; Branson, 16

Yellowstone National Park: Girty, 99a

Zatrachys Cope: Case (E C), 07d

## Cretaceous.

Age and localities of supposed Jurassic fossils: Veatch (A C), 06a

Alabama: Conrad, 60b; Gabb, 61d, e; Tuomey, 58a

Bauhinia: Berry, 10g

Cassidulus: Gabb, 60h

Mollusca: Tuomey, 54

Ripley group, Crinoidea: De Loriol, 82

Tuscaloosa flora: Berry, 13

Alaska: Eichwald, 71; White (C A), 84a; floras: Hollick, 11c

Alberta: Dawson (J W), 86a, 87a, 88d; Whiteaves, 89b

Athabasca district, Ammonites: Whiteaves, 93

Belly River beds, Plantae: Dawson (J W), 85c

Belly River fauna: Lambe, 02

Bow and Belly rivers: Whiteaves, 85

Ceratopsia: Lambe, 13c

chelonian, new; Lambe, 06c

Cheneosaurus: Lambe, 17a

crocodilian from Judith River formation: Lambe, 07

Dinosauria, Belly River formation: Brown (B), 12b; Lambe, 14e; Red Deer River: Sternberg, 17

Edmontosaurus, Edmonton formation: Lambe, 17b

Gorgosaurus: Lambe, 17

Reptilia: Lambe, 99c

Saskatchewan country: Whiteaves, 87b

selachian: Lambe, 18b

Stegosaurus: Lambe, 18

Trachodon, Edmonton formation: Lambe, 13a

Trionyx: Lambe, 02b

woods: Penhallow, 08a

Amber, Coastal Plain: Berry, 07; Staten Island: Hollick, 05a, 06a

Anchiceratops, Alberta: Brown (B), 14a

Ankylosauridae: Brown (B), 08c

Araucarian remains, Atlantic Coastal Plain: Berry, 08a

Araucariopitys: Jeffrey, 07

Arizona: Newberry, 61; Bisbee quadrangle: Stanton, 04

Arkansas: Taff, 02b; Veatch (A C), 06e; White (C A), 82a

Bingen sand, Plantae: Berry, 17a

southwestern: Hill (R T), 88

## Paleontology—Continued.

## Cretaceous—Continued.

Atlantic Coastal Plain flora: Berry, 08a, 90a, 10, 10a, b

Baena: Lambe, 06b

Bear River fauna: White (C A), 95

Birds: Marsh, 70

Boremys: Lambe, 06c

Blattoid: Handlirsch, 06a

Brachiopoda: Gabb, 61a

British Columbia: Whiteaves, 83, 87a, 89b

Cephalopoda: Whiteaves, 95d

Crustacea: Woodward (H), 96, 00

floras: Dawson (J W), 83a

Kettle River region, plants: Penhallow, 07d

Peace River region, plants: Dawson (J W), 81a

Queen Charlotte Islands: Whiteaves, 76, 84a, 85c, 00; Ammonites: Whiteaves, 93b

Vancouver Island: Dawson (J W), 89b; Meek, 61c, 64e, 76b; Shumard (B F), 58a; Whiteaves, 74, 79, 03

Nanaimo group: Whiteaves, 95c

Plantae: Dawson (J W), 94c

Unio: Whiteaves, 01

Bryozoa: Gabb, 62

Buda limestone fauna: Whitney (F L), 11

California: Anderson (F M), 02; Cooper (J G), 94; Gabb, 64a, 67, 69; Smith (J P), 95; Stanton, 96; White (C A), 85, 85b

Coalinga district: Arnold, 09a, 10

Los Angeles, Plagiostoma: Trask, 56c

Mollusca: Cooper (J G), 97

San Jose region, Mollusca: Hall (E B), 16

Santa Ana Mountains: Packard (E L), 16

Santa Clara Valley: Crandall (R), 07

Santa Cruz Mountains: Arnold, 08d

Canada: Whiteaves, 95b; Cretaceous floras: Dawson (J W), 88a

Catalog: Morton, 42

Ceratopsia, evolution: Lull, 12

Chico fauna, Cal.: Stanton, 93a

Chimaeroids: Hussakof, 12a

Cliffwood clays, fauna: Weller, 06d; flora: Berry, 05f, 06d

Colorado: White (C A), 79d, 82a

amber in Laramie: Cockerell, 09m

Boulder area: Henderson (J), 04; Stanton, 88

Dakota beds: Cope, 78h

Denver Basin, vertebrates: Marsh, 96a

fossil fruits and flowers: Cockerell, 11e

Fossil Ridge fauna: Henderson (J), 08a

Mollusca: Conrad, 74

Plantae: Lesquereux, 78b; Mesa Verde: Cockerell, 10

Pierre formation, insect: Cockerell, 12b

Reptilia: Cope, 78ze; Dakota group: Cope, 78k

southwestern, plants: Cockerell, 16a

Vermejo flora: Knowlton, 17

Comanche: Cragin, 97b

Comanchean invertebrates: Cragin, 94b

Conifers, structure: Thompson (W P), 12

Corals, California and Oregon: Nomland, 16

Cordilleran region: Meek, 77

Corythosaurus, Alberta: Brown (B), 14c

Crabs from California: Rathbun, 08

Crinoidea: Springer, 11a



## Paleontology—Continued.

*Cretaceous*—Continued.

- Cristellaria, Ripley group, Ala.: Schlumberger, 82  
 Crocodilian, Judith River formation, Alberta: Lambe, 07  
 Dakota fauna, Nebraska: White (C A), 94  
 Dakota flora: Gress, 18; Lesquereux, 74, 76b, 92  
 Delaware, Mollusca: Morton, 29c  
 Descriptions of species: Hall, 56; White (C A), 74  
 Dewalquea, Alabama: Berry, 10c  
 Didymotis trinidadensis, Trinidad: Sommermeier, 18  
 Dinosauria: Lull, 12a; Alberta: Lambe, 14c, d  
 District of Columbia, Potomac formation, Sinnott, 16  
 Echinodermata: Clark (W B), 15  
 Echinoidea: Clark (W B), 91a; Schlüter, 87  
 Mexico: Cotteau, 90  
 Ripley group, Mississippi: Slocum, 09  
 Exogyra: Stephenson, 14  
 Fishes, actinopterous: Hay (O P), 03  
 Flora: Lesquereux, 76d; Newberry, 81d; Ward (L F), 05  
 Amboy clays, N. J.: Newberry, 86a  
 Atlantic Coastal Plain: Berry, 09a, 11j  
 North and South Carolina: Berry, 07b, c  
 Northwest: Dawson (J W), 86b  
 southern New York and New England: Berry, 15a; Hollick, 06  
 Virginia and North Carolina: Berry, 09e  
 Fox Hills flora: Knowlton, 16  
 General: Conrad, 77; Cope, 74b, 87c; Herriek, 00b; Marcou, 58; Morton, 30, 34; Stanton, 94a; Whitfield, 89c  
 Georgia, Coastal Plain: McCallie, 08; Veatch (J O), 11a  
 flora: Berry, 14  
 Goniolina in Comanche series: Hill (R T), 90a  
 Great Basin region: Meek, 60c  
 Great Plains, northern: Hayden, 62  
 Greenland, flora: Heer, 71, 74  
 northeastern: Ravn, 11a  
 western: Ravn, 18  
 Green Mountain region: White (C A), 77e  
 Gulf region, eastern, and Carolinas: Stephenson, 14  
 Gymnosperms, Kreisherville, N. Y.: Hollick, 07a  
 Haploscapa, Niobrara beds: Conrad, 75  
 Hell Creek beds, Mont.: Brown (B), 07  
 Hoploparia, Mont.: Whitfield, 07  
 Ichthyosaurian, Benton: Gilmore, 14b  
 Insecta, Dakota group: Hagen, 82  
 Invertebrata: Conrad, 55b; Gabb, 60, 60b, 76; Johnson (C W), 05; Meek, 70d, 71; White (C A), 81e  
 catalog: Gabb, 59; Meek, 64c  
 Montana: Whitfield, 76  
 Western States: White (C A), 77, 88a  
 Wyoming: Meek, 76e  
 Iowa, western, flora: Bartsch, 96  
 Jamaica: Duncan, 65; Etheridge, 69  
 Clarendon district: Duncan, 65  
 corals: Vaughan, 99  
 Rudistae: Whitfield, 97b

## Paleontology—Continued.

*Cretaceous*—Continued.

- Judith River beds: Cope, 77a; Stanton, 05; plants: Knowlton, 05  
 Kansas: Cope, 72; Cragin, 89, 94; Gould, 98; Logan, 99  
 Belvidere, plants: Knowlton, 95b  
 Dakota beds, Plantae: Hollick, 95, 03a  
 fish: Woodward, 13  
 Invertebrata: Logan, 98, 99b  
 Leptecodon: Williston, 99a  
 Neocomian: Cragin, 94c  
 Niobrara and Laramie: Sternberg, 11  
 Niobrara beds, Cirripedia: Logan, 97a  
 Ogmodirus (plesiosaur): Williston, 17b  
 Pelecypoda: White (C A), 80c  
 Pisces: Cope, 72d; Crook, 92; Eastman, 95; Loomis, 00; Stewart (A), 98, 98c, 99c, 00; Williston, 00, 00a  
 plants: Hollick, 03b  
 Plesiosaurus: Williston, 97d  
 Pythonomorpha: Cope, 72b; Merriam, 94  
 Reptilia: Cope, 72n; Cragin, 88; and Pisces: Cope, 71, 78f  
 Smoky Hill River: Cope, 71e  
 southern: Stanton, 95a  
 teleosts: Cragin, 01  
 turtle: Williston, 01  
 Uintacrinus: Meek, 76c  
 Vertebrata: Sternberg, 05  
 Knoxville fauna: Stanton, 95  
 Kootanie plants, Great Falls coal field, Mont.: Knowlton, 07a  
 Lance Creek fauna: Hay (O P), 10a  
 Laramie beds, Mont.: Riggs, 06  
 fauna: White (C A), 83b  
 flora: Ward (L F), 87  
 Invertebrata: White (C A), 78, 78b  
 Mollusca: White (C A), 86a; distribution: White (C A), 78a  
 Leptichthys, Kansas: Stewart (A), 99  
 Leptoceratops, Alberta: Brown (B), 14d  
 Leurospondylus, Alberta: Brown (E P), 13  
 Lignitic flora: Lesquereux, 76a  
 Louisiana: Harris, 99c; Veatch (A C), 06c  
 Lower Cretaceous: Stanton, 97a  
 Lower Cretaceous floras of world: Berry, 11a  
 Lymnaeidae of North and Middle America: Baker (F C), 11  
 Mammalia: Osborn, 91  
 Laramie: Cope, 82z  
 Upper Cretaceous: Osborn, 93c  
 Manitoba: Whiteaves, 89b; Foraminifera and Radiolaria: Tyrrell, 91b  
 Maryland: Bagge, 98; Bibbins, 95; Lull, 11  
 Anne Arundel and Prince George cos.: Clark (W B), 89  
 Bauhinia: Berry, 08b  
 eastern shore: Roberts, 96  
 floras: Berry, 14b  
 Lower Cretaceous: Lull, 11, 11a  
 Upper Cretaceous: Clark (W B), 16b  
 Massachusetts, Chappaquidick Island, flora: Hollick, 02  
 Marthas Vineyard: Shaler, 89d; Araucarian: Jeffrey, 10a; plants: Hollick, 95d; White (D), 90  
 Matawan flora: Berry, 03



**Paleontology—Continued.****Cretaceous—Continued.**

- Mentor beds, Kans.: Jones (A W), 98  
 Mesozoic invertebrate faunas: Stanton, 09  
 Mexico: Aguilera, 09a; Felix, 90, 91a; Hellprin, 91a  
   Cardenas: Böse, 06a  
   Caprina limestone: Boehm, 98  
   Cerro de Muleros: Böse, 10  
   Chihuahua: Gabb, 72b  
   Coahuila: Böse, 13  
   Mazapil: Burckhardt, 06c  
   Puebla, San Juan Raya: Villada, 05  
   San Pedro del Gallo: Burckhardt, 12  
 Micrabacia, Upper Cretaceous: Stephenson, 16  
 Mid-Cretaceous, correlation: Osborn, 02c  
 Miocene flora, north Greenland: Heer, 67  
 Minnesota: Winchell (N H), 95a  
   microscopical fauna: Woodward (A), 95  
   Plantae: Lesquereux, 95  
 Mississippi: Conrad, 60b; Gabb, 61d, e; Tuomey, 58a  
   Mollusca: Tuomey, 54  
   Tippah Co.: Conrad, 58  
 Missouri River region: Meek, 60b, e, 61d;  
   catalog of invertebrates: Meek, 56d  
 Missouri River (upper) region: Hall, 56a;  
   Meek, 76  
 Mollusca: Clark (W B), 11a; Conrad, 53c, 66f;  
   Gabb, 61d, e, 66, 77; Marcou, 55c; Morton, 41a, 42  
   catalog: Gabb, 61  
   Laramie beds: White (C A), 83h  
   nonmarine: White (C A), 83k  
   North Carolina: Conrad, 75a  
   Senonian: Böse, 06a  
 Monoclonius, Alberta: Brown (B), 14b  
 Montana: Meek, 56a, b, 73; Stanton, 05  
   blattoid: Handlirsch, 06a  
   Bozeman coal field: Knowlton, 93a  
   central: Bowen (C F), 15  
   crocodile, Judith River beds: Holland, 09  
   dinosaur: Gilmore, 14a  
   Fort Benton beds: Douglass, 03  
   fresh-water Mollusca: Stanton, 03  
   Gastropoda: Meek, 56  
   Great Falls coal field: Fontaine, 93; Newberry, 91  
   Judith River beds, Dryopteris: Knowlton, 15; turtles: Hay (O P), 04a  
   Judith River region: Leidy, 59f  
   Mollusca: Meek, 62  
   protoblattid family: Mitchell, 08  
   tortoise: Riggs, 06  
 Two Medicine formation, Reptilia: Gilmore, 17  
 Montana flora: Knowlton, 00  
 Morrison fauna: Mook, 16  
 Mosasauroid reptile, Alabama: Gilmore, 12  
 Nebraska: Hayden, 59; Shumard (B F), 58e  
   Anisomyon: Meek, 60  
   Dakota fauna: White (C A), 94  
   plants: Lesquereux, 68a  
 New Jersey: Clark (W B), 93a; Conrad, 68b;  
   Credner, 70; Gabb, 61d, e; Mitchill, 14b;  
   Morton, 30, 41b, 46; Weller, 07; Whitfield, 85, 92  
 Adocidae: Cope, 71f

**Paleontology—Continued.****Cretaceous—Continued.**

- New Jersey: Amboy clays flora: Newberry, 95  
 Bauhinia: Newberry, 86b  
 Brachiopoda: Clark (W B), 95c  
 Bridgeton, Yellow Gravel, flora: Hollick, 96  
 Cliffwood: Hollick, 96g, 97c  
 Cliffwood clays: Berry, 06d; Weller, 05, 06d;  
   Pityoxyla: Bailey (I W), 11; Holden (R), 13  
 Cretaceous, Eocene, and Miocene fishes:  
   Fowler, 11  
   crocodile: Morton, 44a  
 Crustacea: Pilsbry, 01  
 dinosaur: Cope, 66b  
 Echinoidea: Conrad, 50  
 Foraminifera: Bagg, 95a, 98a; Reuss, 61  
 Gastropoda: Whitfield, 93a  
 Matawan flora: Berry, 03b, 04a, 05  
 Mollusca: Forbes, 45; Gabb, 60c; Lea, 61;  
   Morton, 29c  
 Moorestown: Woolman, 93a  
 mosasauroids: Marsh, 69b  
 Mount Laurel: Johnson (C W), 98  
 palm: Stevens (N E), 12a  
 Pleurotomaria: Pilsbry, 96  
 Pleurotomiidae: Pilsbry, 12  
 Raritan flora: Berry, 11  
 Timber Creek: Lonsdale, 45; Morton, 29e  
 tortoises: Cope, 71s  
 Unionidae: Lea, 68  
 New Mexico: Meek, 76d  
   Albuquerque region: Herrick, 00b  
   Cerrillos Hills: Johnson (D W), 03  
   distribution: Lee (W T), 12b  
   Mount Taylor region: Shimer, 08a  
   Pinna: White (C A), 81c  
   San Juan Co.: Gilmore, 16  
   flora of Fruitland and Kirtland formations:  
     Knowlton, 16a  
   Invertebrata: Stanton, 16  
   Tucumcari: Hill (R T), 93h  
   Vermejo flora: Knowlton, 17  
 New York, Block Island: Hollick, 98  
   Cretaceous coniferous remains, Kreischerville:  
     Hollick 09a  
   Long Island, Plantae: Hollick, 93a, 94, 03, 04,  
     06, 12a  
   Staten Island, Plantae: Hollick, 92, 92a, b,  
     96f, 98a  
 North Carolina: Emmons (E), 58; Coastal Plain:  
   Clark (W B), 12  
 Northwest Territory, floras: Dawson (J W), 83a  
 Nyctodactylus: Williston, 02d  
 Oklahoma, dinosaur from Trinity: Larkin, 10  
 Oregon, John Day Basin: Merriam, 01a; Rogue  
   River Valley: Anderson (F M), 95  
 Ostreidae: White (C A), 84  
 Pines, leaf structure: Jeffrey, 08  
 Pityoxyla: Jeffrey, 06  
 Plants: Berry, 11c; Heer, 61; Hollick, 06g,  
   Lesquereux, 72a, 74a, 83; Newberry, 60,  
   68, 68f, 98; Penhallow, 06; catalog: Knowlton, 98; Magothy formation: Berry, 07f  
 Plateau province: White (C A), 76  
 Platecarpus, mounted: Williston, 10b  
 Plesiosaurus (Polyptychodon mexicanus),  
   Mexico: Wieland, 10b



## Paleontology—Continued.

## Cretaceous—Continued.

- Porocystis Cragin: Jarvis, 05  
 Potomac flora: Fontaine, 88, 89  
 Potomac formation, age: Ward (L F), 88  
 Potomac group plants: Berry, 11f; ferns: Berry, 11g  
 Pseudoceratites: Hyatt, 03  
 Pteranodon: Eaton (G F), 10  
 Reptilia: Leidy, 65, 65a  
 Ripley fauna, Tenn.: Wade, 17  
 Rocky Mountain region: Delafontaine, 77  
 Saskatchewan: Dawson (J W), 88d; Meek, 59; Whiteaves, 89b  
 Saurian from the Niobrara: Wieland, 09a  
 Sauropod dinosaur, Oklahoma: Larkin, 10  
 Schizaeaceae, lower Cretaceous species: Berry, 11d  
 Scutellaster, Colorado: Cragin, 95  
 Senonian Mollusca: Böse, 06a  
 Shasta fauna, Cal.: Stanton, 93a  
 Shasta-Chico faunas: Stanton, 94  
 South Carolina flora: Berry, 14  
 South Dakota: Evans (J), 57; Meek, 56a, b  
     Black Hills region: Buch, 53; Meek, 58b; Ward (L F), 94; Whitfield, 77, 80; Cycadeoidea: Ward (L F), 98  
 Brachyura: Rathbun, 17  
 Gastropoda: Meek, 56  
 White River region: Hayden, 57a  
 sponge: Shimer 13a  
 Tennessee, Busycon cretaceum: Wade, 17c  
     McNairy Co., Gastropoda: Wade, 17d, e  
     Plantae: Berry, 16f  
 Testudo: Lambe, 06b  
 Texas: Blake (W P), 56; Dumble, 11; Giebel, 53, 53a; Hill (R T), 89a, i, 98b; Prather, 01; Roemer, 52; Shumard (B F), 53, 60a  
 Ammonites: Lasswitz, 04  
 Black and Grand prairies: Hill (R T), 01  
 Buda limestone: Shattuck, 03; corals: Vaughan, 03  
 Camp Bowie area: Shuler, 17  
 Caprina limestone beds: Hill (R T), 93b  
 Choctaw and Grayson terranes: Cragin, 94a  
 El Paso: Stanton, 96a  
 gryphaeas: Hill (R T), 98  
 Inoceramus and Cephalopoda: Schlüter, 87a  
 Invertebrata: Cragin, 93; Hill (R T) 89; Roemer, 88  
 Mesozoic flora: Berry, 12c  
 Mollusca: Conrad, 55c; Hill (R T), 89c; White (C A), 87c  
 Pectinidae: Kniker, 18  
 Pelecypoda: White (C A), 80c  
 Porocystis: Rauff, 95  
 Spongida: Merrill (J A), 95  
 Trinity beds: Hill (R T), 93a; Plantae: Fontaine, 93a  
 Vertebrata: Hay (O P), 16a  
 Terebratula, Cretaceous, Black Hills: Whitfield, 75  
 Torreya, North Carolina: Berry, 08  
 Tortoise: Riggs, 06  
 Trinity beds fossils: Hill (R T), 90c  
 Trochocyathus, Cretaceous, New Jersey: Vaughan, 00d  
 Uinta Mountains: White (C A), 76

## Paleontology—Continued.

## Cretaceous—Continued.

- Uintacrinus, Kansas: Beecher, 00  
 Unio, Laramie group: Whitfield, 03  
 Unionidae, Laramie clays, Montana: Whitfield, 07a  
 Utah: Meek, 73; Schiel, 55a; White (C A), 79d; Ostracoda: Jones (T R), 93  
 Vertebrata: Bowen (C F), 15; Cope, 74b, 75  
 Virginia, Coastal Plain: Clark (W B), 12b; Lower Cretaceous species of Schizaeaceae: Berry, 11d  
 Volutidae: Dall, 07a  
 West Indies: Etheridge, 69  
 Western States: White (C A), 79c, 83  
 Woods, fossil: Platen, 08  
 Wyoming: Meek, 73; Trumbull, 05; White (C A), 79d  
     Frontier formation: Knowlton, 17a  
     Gleichenia: Knowlton, 13a  
     Hay Creek coal field, flora: Fontaine, 99  
     Invertebrata: Meek, 72a  
     Niobrara Co., Lance fauna: Lull, 15c  
     Ostracoda: Jones (T R), 93  
     Sage Creek: Evans (J), 54a  
     starfish: Weller, 05c  
     Yellowstone National Park: Stanton, 99  
     Yukon: Whiteaves, 89b  
 Devonian.  
     Agoniatite limestone fauna: Wilson (J D), 03  
     Alaska: Schuchert, 96; southeastern: Kindle, 07  
     Alberta: Meek, 67  
         Lake Minnewanka spiriferoids: Shimer, 13  
         northern: Whiteaves, 91  
         Roche Miette, helodont teeth: Lambe, 13  
     Amnigenia, occurrence: Clarke (J M), 01b  
     Anthozoa, Helderbergian: Hall, 84f  
     Arctic: Schuchert, 14f; Ellesmere Land: Meyer (O E) 13; Nathorst, 04  
     Arizona, Bisbee quadrangle: Williams (H S), 04  
     Arkansas: Williams (H S), 00a  
     Blastoidea: Roemer, 51; Shumard (B F), 58c  
     Brachiopod, Maine: Williams (H S), 07; with original color markings: Greger, 08  
     Brachiopoda: Hall, 57  
     Bryozoa: Prout, 58b, 59, 60; Rominger, 66; Ulrich, 90c; Hamilton group: Hall, 91b  
     California: Diller, 94b  
     Canada: Billings, 58, 58d; Whiteaves, 06b  
         Brachiopoda: Billings, 59a  
         Ostracoda: Jones (T R), 91  
         Plantae: Dawson (J W), 71b  
     Catalog of fossils: Bigsby, 78  
     Catskill and Chemung faunas, commingling: Ashburner, 84e  
     Cephalopoda: Cleland, 07  
     Chapman sandstone, fauna: Williams (H S), 16  
     Chemung fossils: Hall, 62; catalog: Williams (H S), 82  
     Cirriped, New York: Clarke (J M), 82a  
     Clymenia, Naples beds: Clarke (J M), 92d  
     Clymenia fauna, Montana and New York: Raymond (P E), 12  
     Coblentzian invasion: Clarke (J M), 07  
     Colorado, Cladodus: Hay (O P), 02b  
         Dipterus remains: Eastman, 15  
         Ouray fauna: Girty, 00; Kindle, 09  
         Pisces: Eastman, 04



## Paleontology—Continued.

## Devonian—Continued.

- Colorado: Southwestern: Spencer (A C), 00  
 Corals: Greene (G K), 98  
 Cordilleran region: Hall, 77; Meek, 77  
 Corniferous fauna, Appalachian province: Weller, 02  
 Crinoidea: Wood (Elvira) 04; Springer, 06a, 11a  
 Crinoidea and Brachiopoda, Hamilton of Missouri: Rowley, 94  
 Crustacea, Chemung group: Clarke (J M), 97a  
 Cuboides zone: Williams (H S), 90  
 Cystidea: Schuchert, 04a  
 Dalmanellas of the Chemung: Williams (H S), 08  
 Descriptions: Conrad, 42a; Hall, 61b  
 Devonian and Mississippian faunas: Weller, 09a  
 Devonian flora: Dawson (J W), 70d  
 Dinichthyid armor plates, Marcellus shale, New York: Smith (B), 09a  
 Dinichthys, Huron shale: Branson, 08a, b  
 Dolichocephala lacoana, Catskill group, Pa.; Claypole, 84d  
 Ellesmere Land, Anthozoa: Loewe, 13; Devonian fishes: Kiaer, 15  
 Fenestellidae, Hamilton group: Hall, 87d; Lower Helderberg: Hall, 88c  
 Fishes: Dean, 11; Whiteaves, 07  
 Iowa: Eastman, 08a  
 New York: Eastman, 07b  
 Scaumenac Bay, Quebec: Hussakof, 12  
 Flora: Hall, 63i; eastern Canada: Matthew (G F), 11; Little River group: Matthew (G F), 06  
 Gaspé sandstone fossils: Clarke (J M), 10c; Dawson (J W), 70g; Schuchert, 10b; Williams (H S), 10a  
 General: Clarke (J M), 89c; Sharpe, 48; Williams (H S), 03, 05  
 Goniatite fauna: Hall, 60c  
 Great Basin region: Meek, 60c  
 Hackberry group, Westernia: Webster, 05a  
 Hamilton Bryozoa: Hall, 831  
 Hamilton fossils: Calvin, 88b; Hall, 60b, 62, 62f; Ontario: Shimer, 02  
 Helderberg limestone, Pennsylvania: Reeside, 17  
 Helderbergian fauna: Schuchert, 00a  
 Heteroschisma, Michigan: Wachsmuth, 84a  
 Hypsocrinus: Springer, 06a  
 Hystericrinus, Hamilton group, Ont.: Hinde, 85  
 Illinois, arthropods: Savage, 13b  
 Diplodus: Eastman, 99b  
 Grand Tower fauna: Savage, 10c  
 Invertebrata: Meek, 68, 75b  
 Rock Island Co.: Tiffany, 85  
 Rock Island region: Ekblaw, 12  
 southern: Weller, 97a  
 Indiana: Greene (G K), 98; Kindle, 01; Miller (S A), 82e, 94b; White (C A), 82b  
 Anthozoa, Upper Helderberg: Hall, 83i  
 black slate: Whitfield, 75a  
 Crinoidea: Miller (S A), 94, 96a  
 southern: Kindle, 99  
 Insecta, Canada: Dawson (J W), 67b

## Paleontology—Continued.

## Devonian—Continued.

- Invertebrata: McChesney, 61, 67; Meek, 65j, 66c, 71f  
 Maine, New Brunswick, and Quebec: Clarke (J M), 07a  
 Nevada: Meek, 76e  
 Iowa: Hall, 58, 73; Webster, 89; White (C A), 62a, 76a; Williams (H S), 89  
 annelid: Calvin, 88  
 Blastoidea: Barris, 84  
 Brachiopoda: Webster, 88d  
 Buffalo, Heteracanthus: Lindahl, 97  
 Burlington, "Chemung": White (C A), 62  
 burrowing sponge: Thomas (A O), 11  
 Conocardium: Keyes, 92j  
 Davenport: Barris, 80a  
 Dipterus: Udden, 99b  
 Hackberry group: Webster, 05; Gastropoda: Webster, 05b, 09; Westernia: Webster, 05a  
 Independence shale: Calvin, 78  
 Lime Creek fauna: Calvin, 83  
 Macgeea: Webster, 89b  
 Mollusca: Keyes, 88e  
 northeastern: Haines, 10  
 Pachyphyllum: Webster, 05c  
 Pisces: Eastman, 97c, 03c  
 Rockford shales: Webster, 88a  
 Scott Co.: Tiffany, 85  
 Spirifera: Calvin, 92b  
 Ithaca fauna, Maryland: Swartz, 07; New York: Clarke (J M), 05d; Kindle, 96  
 Ithaca section, New York: Williams (H S), 06  
 Jefferson limestone fauna: Rocky Mountain region: Kindle, 08b  
 Kentucky: Herzer, 02a  
 black shale: Girty, 98  
 central: Kindle, 99  
 Crinoidea: Miller (S A), 94  
 east-central: Foerste, 06  
 Falls of the Ohio: Hall, 79c; Chaetetes: Rominger, 92  
 fossil wood: Dawson (J W), 91c  
 Louisville region: Hall, 72; Yandall, 47  
 Mollusca and Brachiopoda: Nettleroth, 89  
 Lamellibranchiata: Williams (H S), 86a  
 Lime Creek fauna: Keyes, 06h  
 Little River group: Matthew (G F), 06  
 Lycopod, composite: White (D), 07c  
 Mackenzie River region: Meek, 67  
 Maine: Billings, 69; Williams (H S), 00  
 Chapman fauna: Clarke (J M), 09a  
 Cobscook Bay: Shaler, 86  
 Moose River fauna: Clarke (J M), 09a  
 Parlin Stream: Pirsson, 14  
 Perry: Hitchcock (C H), 62a; Plantae: Dawson (J W), 61g; Smith (G O), 05  
 Manitoba: Billings, 59i; Whiteaves, 80, 91a, 92  
 Manlius fauna: Schuchert, 03b  
 Marcellus fauna and flora: Clarke (J M), 89b  
 Marcellus faunas: Clarke (J M), 03i  
 Maryland: Clarke (J M), 13e  
 Brachiopoda: Schuchert, 13c  
 Brachiopoda, Pelecypoda, Gastropoda, Cephalopoda, Trilobita: Prosser, 13c  
 Bryozoa: Ulrich 13c  
 Cephalopoda: Ohern 13b



## Paleontology—Continued.

## Devonian—Continued.

- Maryland: Coelenterata: Prosser, 13b; Swartz, 13b  
 Crinoidea: Ohern, 13a  
 Cystoidea: Schuchert, 13b  
 Gastropoda: Ohern, 13b  
 Ostracoda: Ulrich, 13d  
 Paleodevonian: Ohern, 07  
 Pelecypoda: Ohern, 13b  
 Pisces: Swartz, 13d  
 Portage and Chemung faunas: Swartz, 08  
 Trilobita: Ohern, 13b  
 Tropidoleptus fauna: Swartz, 10  
 Vermes: Kindle, 13; Ohern, 13a  
 Megistocrinus, Michigan: Wachsmuth, 84  
 Michigan, Alpena, Crinoidea: Barris, 84a  
 Blastoidea: Barris, 84  
 corals: Rominger, 76b  
 Detroit River series: Stauffer, 18  
 Dundee limestone fauna: Grabau, 13c  
 Hamilton group, Blastoidea: Barris, 83  
 Huron fauna: Winchell (A), 62b  
 Limestone Mountain, Houghton Co.: Case 15a  
 Little Traverse Bay: Winchell (A), 66  
 Schoharie fauna: Grabau, 08  
 Upper Peninsula: Hall, 51c  
 Migration and shifting of faunas; Williams (H S), 10b  
 Missouri: Rowley, 95; Swallow, 60, 63  
 Boone Co., Pleutomaria: Broadhead, 96  
 central: Greger, 09  
 fishes: Branson, 13, 14  
 Syringothyris: Schuchert, 10c  
 Montana: Haynes, 16  
 crinoid: Raymond (P E), 12b  
 red shales fauna: Raymond (P E), 09  
 Three Forks: Raymond (P E), 07  
 Mollusca: Conrad, 46; nonmarine: White (C A), 83k  
 Naples fauna: Clarke (J M), 04; Dreverman, 05  
 Nettleroth collection: Bassler, 09b  
 Nevada: Meek, 70e; Eureka district: Walcott, 84  
 New Brunswick: Wilson (W J), 10a  
 Campbelltown: Whiteaves, 81d  
 Crustacea: Salter, 63  
 Dalhousie fauna: Clarke (J M), 09a  
 Insecta: Dawson (J W), 90e; Scudder, 65a, 80  
 Little River group: Matthew (G F), 95;  
 flora: Matthew (G F), 10b  
 Pisces: Woodward (A S), 89, 92  
 St. John: Dawson (J W), 81g  
 Scaumenac Bay and Campbelltown, fishes: Traquair, 90  
 Scaumenac Bay, Pisces: Woodward (A S), 92a  
 southern: Ellis, 12; Matthew (G F), 89b  
 New Hampshire, Littleton area: Lahee, 13  
 New Jersey: Weller, 03  
 New Mexico, Lime Creek fauna: Keyes, 06h  
 New York: Bigsby, 58; Clarke (J M), 02g, 12;  
 Hall, 59, 62; Olsson, 12a; Slocum, 06; Williams (H S), 82b, 83b, 84  
 Becraft Mountain, Columbia Co.: Grabau, 03  
 Brachiopoda: Hall, 63, 67  
 Buffalo, Crustacea: Grote, 75, 75a; Waterlime fauna: Pohlman, 81, 82, 86

## Paleontology—Continued.

## Devonian—Continued.

- New York: Cayuga Lake region: Cleland, 03a;  
 Williams (H S), 80a; Lower Helderberg: Williams (S G), 87  
 central: Clarke (J M), 97  
 Chemung (base): Williams (H S), 83  
 Chemung crinoids: Williams (H S), 82a  
 Chemung Crustacea: Clarke (J M), 97a  
 Coelenterata, Lower Helderberg: Girty, 97  
 Columbia Co., Oriskany fauna: Beecher, 92  
 corals and Bryozoa: Hall, 87  
 Crinoidea: Hall, 62c  
 Crustacea: Clarke (J M), 83; Hall, 62b, 63f, 88  
 Delaware Co., Pisces: Eastman, 99  
 eastern: Prosser, 95  
 Erie Co.: Grabau, 98a  
 Eurypteris: Roemer, 48d  
 fishes: Smith (B), 10  
 fossil wood: Dawson (J W), 91c  
 fucoid, new: Hollick, 10b  
 Genesee and Portage shales, Pisces: Williams (H U), 86  
 Genesee Co., Hamilton: Monroe, 02  
 Genesee section: Williams (H S), 87  
 Hamilton and Chemung series: Prosser, 97  
 Hamilton and Portage: Prosser, 93b  
 Hamilton fauna: Grabau, 99  
 Helderbergian corals and bryozoans: Hall, 79b  
 Ithaca region: Kindle, 96; Williams (H S), 06  
 Lepidodendron: Clarke (J M), 87b  
 Livonia salt shaft: Clarke (J M), 94, 94a  
 Lower Helderberg corals and bryozoans: Hall, 83b  
 Marcellus faunas: Clarke (J M), 01; Wood (Elvira), 01  
 Mollusca: Hall, 79  
 Naples fauna: Clarke (J M), 99  
 Olean quadrangle: Butts, 03; Clarke (J M), 02e  
 Onondaga Co.: Schneider, 94  
 Ontario Co.: Clarke (J M), 85a  
 Orange Co., Trilobite Mountain: Shimer, 05  
 Oriskany fauna: Clarke (J M), 00; Homalonus: Whitfield, 85c  
 paleontology and isolation: Clarke (J M), 10b  
 Pelecypoda: Hall, 71b, 84, 85  
 phyllopois: Clarke (J M), 82  
 Pisces: Williams (H S), 82c  
 Plantae: Penhallow, 93  
 Port Ewen fauna: Clarke (J M), 09a  
 Portage group: Whitfield, 05; Spirifer laevis: Williams (H S), 81  
 Rhinocaris: Clarke (J M), 93c  
 Rondout: Van Ingen, 03  
 Schoharie Valley: Grabau, 06  
 Spongida, Lower Helderberg: Girty, 97  
 starfishes near Saugerties: Clarke (J M), 12b  
 Tropidoleptus fauna, Canandaigua Lake: Raymond (P E), 04  
 Tropidoleptus zones: Williams (H S), 13  
 Tully limestone: Williams (S G), 87a  
 Upper Helderberg Bryozoa: Hall, 83b  
 Watkins Glen-Catatonk district: Williams (H S), 09  
 western: Clarke (J M), 91e; Hall, 43; Pisces: Hussakof, 18  
 Northeastern America, flora: Dawson (J W), 62a



## Paleontology—Continued.

## Devonian—Continued.

- Northwest Territory, MacKenzie River valley:  
Kindle, 16b
- Ohio: Herzer, 02a; Meek, 71e; Stauffer, 09;  
Whitfield, 82b, 91
- Algae: Lesquereux, 90
- Anthozoa: Nicholson, 75a
- Corniferous: Bownocker, 90
- Crinoidea: Hall, 75b
- Crustacea: Whitfield, 80b
- Cystiphyllum: Nicholson, 75f
- Franklin Co.: Orton, 78a
- Invertebrata: Meek, 73b
- northeastern: Prosser, 12a
- northern: Stauffer, 16b
- Ohio shales faunas: Branson, 11a
- Pelecypoda: Hall, 73a
- Pisces: Claypole, 93a; Dean, 99a; Newberry,  
57b, 68b, 73b; placoderm fishes: New  
berry, 85j
- Plantae: Herzer, 02; Newberry, 83d
- Ohio basin: Claypole, 03
- Oklahoma, Hunton formation: Reeds, 11
- Onondaga fauna, Allegheny region: Kindle, 12
- Ontario: Billings, 60, 74a; Grant (C C), 95a;  
Nicholson, 74a, c, h, 75
- Anthozoa: Billings, 59f
- Bryozoa: Nicholson, 74e, 75g
- Cystiphyllum: Nicholson, 75f
- Favosites: Nicholson, 73d
- Hamilton fauna: Billings, 57b; Calvin, 88b;  
Whiteaves, 89, 98
- Invertebrata: Nicholson, 74
- Kwataboahagan River: Parks, 04
- Moose River: Whiteaves, 77a
- Onondaga limestone: Stauffer, 18
- southwestern: Stauffer, 15
- Stromatoporoidea: Nicholson, 87
- Walpole, Cyrtina: Billings, 63c
- Widder, Nucleocrinus: Montgomery (H), 81
- Oriskanian fauna: Schuchert, 89, 00a
- Ostracoda: Jones (T R), 90a; Ulrich, 90f
- Palaeochinoidea: Olsson, 12
- Paleaster eucharis: Cole (A H), 92
- Paleozoic floras: White (D), 09a
- Panenka, Ontario, Corniferous: Whiteaves, 91d
- Pelecypoda: Hall, 84e
- Pennsylvania: Millward, 09; Simpson (G B),  
90
- Altoona: Kindle, 06a
- Catskill: Claypole, 83; Cope, 92b
- Ceratiocaridae: Beecher, 84
- Chemung, Pisces: Claypole, 85e
- eastern: Prosser, 95
- Erie Co., Prestwichia: Williams (H S), 85
- Eurypteridae: Hall, 84h
- Ostracoda: Jones (T R), 89
- Pike Co., Hamilton: Heilprin, 83c
- Plantae: Penhallow, 93
- Rectogloma: Van Tuyl, 14
- Xiphosuran: Beecher, 02
- Pisces: Hussakof, 18; Leidy, 56; Newberry, 89;  
Erie shale, Ohio: Newberry, 88k
- Plantae, Maine, Quebec, New York: Dawson  
(J W), 63b; New Brunswick and Nova  
Scotia: Matthew (G F), 07a
- Portagefauna: Luther, 02

## Paleontology—Continued.

## Devonian—Continued.

- Quebec, Chaleur Bay, plants: Dawson (J W),  
81f
- fishes: Whiteaves, 81a
- Gaspe: Billings, 74; Clarke (J M), 05a, 08b,  
11a; crustacean: Woodward (H), 71;  
Plantae: Dawson (J W), 59a; Penhallow,  
90
- Montreal area: Ami, 96; Helderbergian fos-  
sils: Schuchert, 01
- Percé, trilobite: Clarke (J M), 13d
- Pisces: Traquair, 93
- Pteriothys: Whiteaves, 80a
- St. Helen's Island: Deeks, 90; breccias fauna:  
Williams (H S), 10; Helderberg: Donald,  
80
- Scaumenac Bay, ostracoderm: Woodward  
(A S), 00; Pisces: Hussakof, 12; White-  
aves, 81b, 83b, 87c
- Reticularia laevis: Kindle, 06
- Rockford shales, Iowa: Webster, 88c
- Rocky Mountain region: Meek, 70c
- Spirifer urbana, Hamilton group: Calvin, 88f
- Spirifera parryana: Calvin, 88e
- Spirifers, evolution: Grabau, 07i
- Sponges, Hamilton group, Ind.: Whitfield,  
05a
- Sporangites: Clarke (J M), 85; Dawson (J W),  
86d
- Stromatopora, Ontario: Nicholson, 73a, 74d
- Taxocrinus, Iowa: Meek, 65f
- Tennessee, Camden chert: Safford, 99
- Rensselaerina, Linden shale: Dunbar, 17
- western: Dunbar, 18
- Tree trunk: White (D), 07
- Tully limestone, dwarf fauna, New York:  
Grabau, 17; Loomis, 03
- Upper Helderberg: Hall, 62; Bryozoa: Hall,  
83l
- Upper Mississippi Valley: Owen (D D), 40
- Utah, Wasatch Mountains: Tenny, 73
- Virginia, Chemung fauna: Kindle, 11a
- Western: Webster, 05a
- Wisconsin: Cleland, 11; Whitfield, 82a
- Milwaukee: Monroe, 99; Crinoidea and Blas-  
toidea: Weller, 98a; plants: Penhallow,  
08
- Yellowstone National Park: Girty, 99a
- Jurassic.**
- Alaska: Pompeckj, 00; White (C A), 84a
- Cape Lisburne, flora: Knowlton, 14
- Matanuska Valley, Plantae: Knowlton, 16c
- Yakutat fauna: Ulrich, 04a
- Allosaurus: Matthew (W D), 08
- Ammonites, Mexico: Pohlig, 85
- Baptanodon, Wyoming: Gilmore, 06, 07a
- Black Hills region: Meek, 60b; Whitfield, 06
- British Columbia: White (C A), 85d
- coast range: Whiteaves, 78, 78a
- Vancouver Island, Sutton formation: Clapp  
(C H), 11a
- California: Hyatt, 94a; Meek, 64a; Smith (J P),  
95
- auriferous slates fauna: Meek, 65
- Santa Lucia Mountains: Davis (C H), 13
- Taylorville region: Hyatt, 92
- Camptosaurus: Gilmore, 09



## Paleontology—Continued.

*Jurassic*—Continued.

- Colorado, Denver Basin, vertebrates: Marsh, 96a  
 Probaena: Hay (O P), 03b  
 Cordilleran region: Hall, 77; Meek, 77  
 Crinoid, new: Springer, 09  
 Cuba: Lea, 40; Cephalopoda: Torre, 10, 10b  
 Descriptions: White (C A), 74  
 Dinosaurs: Holland, 12  
 Dryolestes: Marsh, 78c  
 Echinodermata: Clark (W B), 15  
 Floras: Ward (L F), 00, 05  
 Fresh-water invertebrates: White (C A), 86  
 General: Cope, 87c  
 Goniopholis, Colorado: Cope, 88r  
 Great Basin region: Meek, 60c  
 Greenland: Fraas, 04  
 Cape Stewart, Mollusca: Lundgren, 96;  
   plants: Hartz, 96  
   eastern: Madsen, 03  
   northeastern: Ravn, 11a  
 Idaho, southeastern: White (C A), 79  
 Invertebrata: Meek, 70d  
   catalog: Meek, 64c  
   Montana: Whitfield, 76  
   upper Missouri: Meek, 65a  
   Western States: White (C A), 77  
   Wyoming: Meek, 76e  
 Mesozoic invertebrate faunas: Stanton, 09  
 Mexico: Felix, 90, 91a  
   Durango: Johnson (D W), 02a  
   Mazapil: Burckhardt, 06c  
   Mixteca Alta, Liassic flora: Wieland, 13, 14a  
   Puebla, Liassic plants: Díaz Lozano, 16  
   Russian boreal types in upper Jurassic fauna:  
     Burckhardt, 11  
   San Luis Potosí, Catorce: Castillo, 95  
   San Pedro del Gallo: Burckhardt, 12  
   Tehuacan: Nyst, 40  
   Vera Cruz, Liassic plants: Díaz Lozano, 16  
 Missouri River region: Meek, 60e  
 Mollusca, boreal types in Mexico: Burckhardt,  
   12a  
   Pacific States: Gabb, 69a  
 Montana, Invertebrata: Meek, 72a, 73  
 Morrison fauna: Mook, 16  
 Oregon: Knowlton, 10d  
 Ostreidae: White (C A), 84  
 Peltoceras, Alberta: Whiteaves, 07a  
 Plateau province: White (C A), 76  
 Rhynchocephalian reptile, Wyoming: Gilmore  
   09a  
 Russian boreal types in Mexico: Burckhardt,  
   11a  
 Saurian remains within fish: Eastman, 11b  
 South Dakota, Black Hills region: Meek, 58b;  
   Whitfield, 77, 80; fishes: Eastman, 99a  
 Stepheoceras, British Columbia: Whiteaves, 09  
 Texas, Malone fauna: Cragin, 05  
 Uinta Mountains: White (C A), 76  
 Utah, Apatosaurus: Holland, 16; tortoise  
   Gilmore, 16b  
 Western States, Invertebrata: White (C A), 83e  
 Wyoming: Meek, 61d  
   Baptanodon: Gilmore, 05  
   Cycads: Ward (L F), 00c

## Paleontology—Continued.

*Jurassic*—Continued.

- Wyoming: Freeze-out Hills: Logan, 00a  
 frog: Moodie, 12c  
 plesiosaurs: Mehl, 12a  
 Yellowstone National Park: Stanton, 99

*Mesozoic (undifferentiated).*

- Alaska: Hyatt, 96a  
 Bibliography, Invertebrata: Boyle, 93  
 British Columbia: Billings, 73  
 Mexico: Bárcena, 75b

*Ordovician.*

- Agelacrinidae: Foerste, 14b  
 Agelacrinites, Canadian: Raymond (P E), 15  
 Alaska, Port Clarence limestone faunas: Kindle,  
   11d  
 Algae, Trenton limestone: Whitfield, 94a  
 Algæ, Trenton, New York: Ruedemann, 09a  
 Annelid teeth, Ohio: Foerste, 88a  
 Annelida, jaws, Cincinnati: Grinnell, 77  
 Annelids, tubicolar, Cincinnati: Nicholson, 73c  
 Anticosti Island faunas: Twenhofel, 14  
 Arctic regions: Schuchert, 14f; Whitfield, 00a  
   Baffin Land, Trenton: Schuchert, 00  
   Boothia Felix and King William Land:  
     Holtedahl, 12  
   Ellesmere Land: Holtedahl, 13  
   Frobisher Bay: Emerson, 79  
 Arkansas: Williams (H S), 00a  
 Arnheim formation: Foerste, 12b  
 Asaphidae: Raymond (P E), 12a; Canada:  
   Raymond (P E), 13f  
 Beekmantown fauna: Ruedemann, 06; Seely, 06;  
   Mohawk Valley: Cleland, 03  
 Bellerophon, etc.: Hall, 61a  
 Bibliographic index: Bassler (R S), 15a  
 Billingsia: Ford (S W), 86a  
 Black River fauna: Billings, 58; trilobites,  
   Ottawa: Raymond (P E), 08b  
 Brachiopoda: Walcott, 12  
   distribution in Arnheim and Waynesville:  
     Foerste, 05a  
   Galena and Maquoketa: Sardeson, 96  
   Richmond group: Foerste, 09e  
   sedimentary relations: Burling, 14a  
 British Columbia: Walcott, 10; Kicking Horse  
   Pass: Lapworth, 87a  
 Bryozoa: Rominger, 66; Ulrich, 90c  
   Indiana, Vevay: Cumings, 01b  
   James' types: Bassler, 06  
 Calcareous, New York: Cleland, 00  
 Canada: Billings, 56b, k, 57, 58, 58d, 60b, 65,  
   65b; Salter, 59; Whiteaves, 06b  
 Asterozoa: Billings, 58b  
 Atlantic coast region: Matthew (G F), 95b  
 Brachiopoda: Billings, 59b  
 Bryozoa: Foord, 83  
 Crinoidea: Billings, 59  
 Cystidea: Billings, 58a  
 Ostracoda: Jones (T R), 91  
 Catalog of fossils: Bigsby, 68  
 Cephalopoda, Beekmantown and Chazy.  
   Ruedemann, 06  
 Ceraurinus: Barton, 13  
 Ceraurus, revision: Raymond (P E), 13i  
 Champlain Valley: White (T G), 00  
 Chazy fauna: Hudson, 07; Raymond (P E),  
   05b, 06, 16b; Ruedemann, 06; Seely, 06



**Paleontology—Continued.****Ordovician—Continued.**

- Chazy fauna: Brachiopoda and Ostracoda:**  
 Raymond (P E), 11  
**Ottawa Valley: Raymond (P E), 11a**  
**Pelecypoda: Whiteaves, 08**  
**Trilobita: Raymond (P E), 05, 10b; Ontario:**  
 Raymond (P E), 10e  
**Cincinnatian: Anthony, 47; Faber, 86; Foerste,**  
 88, 09c, d, 10, 12a; Hall, 60e, 61, 66, 72b;  
 James (J F), 85d, 91; James (U P), 74a, b,  
 78, 84, 84a; Meek, 71b, 72d, e, f; Miller  
 (S A), 74, 75d, 78, 78a, b, 79c, 80e, 81b, d,  
 g, 82a, b, d, e, 84, 92b, 94c, e; Orton, 73;  
 Ulrich, 78a, 79, 79a, 89b; Wetherby, 81a  
**annelids: Ulrich, 78**  
**Brachiopoda: James (U P), 74, 74c; Miller**  
 (S A), 75  
**Bryozoa: Miller (S A), 82; Nicholson, 75j, k;**  
 Ulrich, 79a, 82  
**catalog: Harper, 96; James (U P), 75; Miller,**  
 (S A), 79  
**Cephalopoda: James (J F), 86; Miller (S A),**  
 75a  
**conodonts: James (U P), 84b**  
**Crinoidea: Ulrich, 82a; Glyptocrinus baeri:**  
 James (U P), 85  
**Crustacea: Miller (S A), 74b**  
**Dekayia, etc.: Cumings, 02a**  
**Echinodermata: Meek, 72c**  
**fucoids: James (J F), 85c**  
**Gastropoda: Miller (S A), 74d**  
**Homotrypa: Bassler, 03**  
**Homotrypa bassleri: Nickles, 02a**  
**Indiana: Cumings, 08**  
**list: Mickleborough, 78**  
**Monticuliporoidea: James (U P), 87a**  
**nomenclature: James (J F), 88c; Miller (S A),**  
 79a; Ulrich, 88d  
**Paleaster: Miller (S A), 80d**  
**Pelecypoda: Miller (S A), 74c, e, 81a;**  
 Whitfield, 78  
**Protozoa: James (J F), 87**  
**trails: Miller (S A), 80**  
**types: Foerste, 16b**  
**Colorado, Canon City: Walcott, 92a; Pisces:**  
 Walcott, 91d  
**Conchicolites and Ortonia: Nicholson, 74j**  
**Conularia, sessile, New York: Ruedemann, 96**  
**Cordilleran region: Hall, 77; Meek, 77**  
**Crinoidea: Meek, 65g**  
**Cryptophragmus: Raymond (P E), 14b**  
**Cryptozoa, Vermont and New York: Seely, 06**  
**Cyclocystoides: Raymond (P E), 13d**  
**Cynthiana formation, fauna: Miller (A M), 15**  
**Cyrtolites, Cincinnatian: James (U P), 72**  
**Descriptions: Conrad, 42a; White (C A), 74**  
**D'Orbigny's types figured: Boule, 06**  
**Fish remains, Black Hills: Darton, 09d**  
**Franklin: Ami, 06**  
**Gastropoda: Sardeson, 03; Chazy formation:**  
 Raymond (P E), 08  
**General: Agassiz (L), 63c; Barrande, 53a; Cas-**  
 telnau, 43; Emmons (E), 54; Sharpe, 48  
**Gomphoceras, Trenton, Wisconsin: James (J**  
 F), 86a  
**Graptolites, New York: Ruedemann, 08**

**Paleontology—Continued.****Ordovician—Continued.**

- Hybocystis, Ontario: Parks, 08b**  
**Idaho, Wood River valley: Blackwelder, 13**  
**Illinois, Invertebrata: Meek, 68, 75b**  
 southern: Savage, 10a  
**Spongida: Ulrich, 90b**  
**Thebes sandstone: Savage, 18b**  
**Trenton fossils: Walcott, 79b**  
**Indiana: Greene (G K), 98; Miller (S A), 92**  
**Batostoma, Richmond series: Cumings, 12b**  
**Franklin Co.: Moore (D R), 85**  
**Jefferson Co.: Cornett, 75; Hubbard (G C),**  
 92a  
**Richmond: Plummer, 43; list of fossils:**  
 Haines, 79  
**Richmond beds: Coryell, 15a**  
**Tanner's Creek: Cummings, 13**  
**Invertebrata: McChesney, 61; Meek, 65j, 66c, d;**  
 Western States: White (C A), 77  
**Iowa, Fayette Co., Maquoketa beds, trilobites:**  
 Slocom, 13, 16  
**Graf: Thomas (A O), 14**  
 northeastern: Haines, 10  
**Isochilinae, Canada: Jones (T R), 03**  
**Isotelus gigas, ontogeny: Raymond (P E), 14**  
**Kentucky: Foerste, 13b; James (U P), 78;**  
 Nickles, 05  
**Brachiospongia: Marsh, 67b**  
 central: Linney, 82  
**Franklin Co.: Miller (A M), 14**  
**Georgetown quadrangle: Miller (A M), 13a**  
**Mollusca and Brachiopoda: Nettleroth, 89**  
**Land plants: Lesquereux, 74d; so-called: New-**  
 berry, 74f  
**Lepadocystinae: Foerste, 14b**  
**Lévis: Raymond (P E), 14e**  
**Lexington fossils: Foerste, 09d, 10**  
**Lichas: Ulrich, 92c**  
**Lichenaria: Sardeson, 99b**  
**Lingula, Murray Bay, Quebec: Billings, 61**  
**Lingulasma, Lingula and Trematis: Ulrich, 89b**  
**Lorraine faunas, New York and Quebec:**  
 Foerste, 14a  
**Maine, Penobscot Co.: Dodge (W W), 81;**  
 graptolites: Dodge (W W), 90  
**Maloney series: Duror, 16**  
**Manitoba: Parks (W A), 15; Whiteaves, 80, 81**  
**Bryozoa and Ostracoda: Ulrich, 89**  
**Cephalopoda: Whiteaves, 90**  
**Lake Winnipeg region: Dowling, 00a; Whit-**  
 eaves, 96, 97  
**Red River valley: McCharles, 87; Panton, 84a**  
**Sceptropora: Ulrich, 88c**  
**Shamattawa River: Parks, 13**  
**Stony Mountain: Whiteaves, 95a**  
**Trenton, Gastropoda: Whiteaves, 93a**  
**Winnipeg basin, Orthoceratidae: Whiteaves,**  
 92a  
**Maryland, Frederick Co.: Keyes, 90g**  
**Michigan, Limestone, Houghton Co.: Case, 15a**  
**Little Bay de Noquette: Foerste, 17c**  
**Upper Peninsula: Hall, 51c**  
**Minnesota: Sardeson, 92a, 01d; Winchell (N H),**  
 86a, 95b  
**Brachiopoda: Winchell (N H), 80b, 81a, 92d,**  
 95c



## Paleontology—Continued.

## Ordovician—Continued.

- Minnesota: Bryozoa: Ulrich, 86a, 95a  
 Cephalopoda: Clarke (J M), 97c  
 Gastropoda: Ulrich, 97b  
 Ostracoda: Ulrich, 97a  
 Pelecypoda: Ulrich, 92, 92a, 97  
 Trilobita: Clarke (J M), 97b  
 Monticuliporoids, Cincinnati: Nicholson, 74g, 76  
 Nettleroth collection: Bassler, 09b  
 Nevada, Eureka district: Walcott, 84  
 New Brunswick, St. John: McLearn, 15b  
 New Jersey: Weller, 03  
 New York: Bigsby, 58; Foerste, 16; Hall, 47  
 Beekmantown: Walcott, 79c; Whitfield, 89  
 Canaan: Ford (S W), 86  
 Chazy: Walcott, 79b; Ceraurus: Raymond (P E), 16c  
 Columbia Co.: Bishop, 90; Dwight, 87a  
 Dutchess Co.: Dwight, 79, 80  
 Essex Co., Crown Point section: Raymond (P E), 02  
 Hudson River beds: Ruedemann, 01  
 Montgomery Co.: Cumings, 00  
 Orange Co.: Darton, 85  
 Plectoceras jason: Ruedemann, 12  
 Poughkeepsie region: Dale, 78, 79b, d; Dwight, 80a  
 Schodack Landing: Ford (S W), 84a  
 Staten Island, fossils in drift: Gratacap, 87a, 89  
 Trenton: Hall, 50; Raymond (P E), 03; Walcott, 84b; White (T G), 96; Remopleurides: Walcott 75a; Rensselaer Co.; Ruedemann, 01a; Spheroecoryphe: Walcott, 75  
 Utica slate fauna: Walcott, 83a  
 Wappinger Valley: Dwight, 81, 83, 84  
 Ohio: James (U P), 78  
 Adams Co., starfish: Williams (S R), 14  
 Bryozoa: Nicholson, 75a, c  
 Cincinnati: Meek, 72f; Nickles, 02; Bryozoa, Nicholson, 75j, k; starfish: Graham, 46  
 Invertebrata: Hall, 75a; Meek, 73b  
 Pelecypoda: Ulrich, 93  
 Richmond near Oxford: Shideler, 07; Williams (S R), 10  
 Oklahoma, McAlester coal field: Girty, 99  
 Ontario: Chapman (E J), 59b; Foerste, 16; Nicholson, 75  
 Agelacrinites: Chapman (E J), 60b  
 Anthozoa: Billings, 56e  
 Asaphus: Chapman (E J), 58a  
 Astrocystites, Ottawa: Whiteaves, 97a  
 Belleville district: Chapman (E J), 60a  
 Brachiopoda: Billings, 56j  
 Bryozoa: Nicholson, 75g  
 Crinoidea: Billings (W R), 87  
 Cystidea, Trenton limestone: Billings, 54 eastern: Ami, 04  
 Grenville sheet: Ami, 01a  
 Kingston area: Wilson (A E), 16  
 Labechia: Lambe, 99d  
 Lake Simcoe area: Johnston (W A), 12  
 Manitou Islands, Lake Nipissing: Ami, 92c  
 Nipissing-Timiskaming area: Ami, 99

## Paleontology—Continued.

## Ordovician—Continued.

- Ontario: Ottawa area: Ami, 84, 84a, 85, 87c, d, 92a, 96a, 99g, 01; Billings (W R), 81; Salter, 52a; Stewart (J), 88  
 brachiopod: Wilson (A E), 13  
 Matheria brevis: Whiteaves, 03c  
 pelecypod; Wilson (A E), 15  
 starfish: Raymond (P E), 12b  
 Stephanella: Hinde, 91  
 Trenton: Billings (W R), 85a; Hinde, 89  
 Utica slate: Ami, 82a, 88b  
 Peterborough, Ageacrinites: Chapman (E J), 60d  
 Russell Co., Rockland: Ami, 93a; Trenton: Ami, 00h  
 Toronto: Coleman, 13c; Smith (J F jr), 59; annelid jaws: Hinde, 79a  
 Trenton: Billings (W R), 83; Crinoidea: Billings, 56c; Billings (W R), 85; echinoderm fauna at Kirkfield: Springer, 11b  
 trilobites: Billings, 59d; Narraway, 12  
 Utica: Ami, 92d  
 Whitby, Triarthrus: Smith (J F jr), 61  
 Wolfe Island, Trenton: Mather, 17b  
 Orthis insculpta, distribution: Christy, 58  
 Ostracoda: Ulrich, 90f, 92b; Jones (T R), 90  
 Palaeosaccus, Quebec group: Hinde, 93  
 Pelecypoda: Ulrich, 90d; Minnesota and Wisconsin: Ulrich, 92a  
 Pelmatozoa, Chazy, New York: Hudson, 07, 11  
 Pembroke area, Ontario and Quebec: Ami, 07  
 Pennsylvania, Bellefonte: Collie, 03  
 Periglyptocrinus priscus: Parks, 09a  
 Pisces: A., 91  
 Protaster: Parks, 08a, 09  
 Protopalaeaster narrawayi: Raymond (P E), 12  
 Quebec: Ami, 91; Foerste, 16  
 Anticosti: Billings, 66; Brachiopoda: Shaler, 65  
 Aylmer, Chazy formation: Sowter, 88  
 Bryozoa: Ami, 92b  
 Calciferos: Billings, 59c  
 Chazy: Billings, 59e  
 graptolite-bearing beds: Lapworth, 87  
 Grenville sheet: Ami, 01a  
 Joliette: Ami, 92c  
 Levis: Raymond (P E), 14d  
 Mingan and Anticosti Islands: Schuchert, 10d  
 Montreal area: Ami, 96; Whiteaves, 65  
 Murray River, Utica: Ami, 88a  
 Ottawa district: Ami, 01  
 Phillipsburgh, Calciferous: Billings, 61a  
 Quebec: Bigsby, 53; Ford (S W), 87  
 Quebec group: Dawson (J W), 93d; Logan, 60a; Nicholson, 73  
 Utica: Ami, 92d  
 Richmond fauna: Foerste, 03, 17b; Little Bay de Noquette, Mich.: Foerste, 17c  
 Rocky Mountain region: Meek, 70c  
 Rogers Gap fauna, Ky.: Foerste, 14  
 St. Bruno Mountain fossils: Whiteaves, 10  
 St. Hilaire: Ulrich, 10  
 St. Peter sandstone: James (J F), 94; Sarde-son, 96a  
 Scolithus, Chazy formation, Ottawa: Ami, 87



**Paleontology—Continued.****Ordovician—Continued.**

- Siphonotreta, Utica formation, Ottawa: Whiteaves, 82
- Spongida: Ulrich, 89a; Chazy formation: Seely, 02
- Starfish with ambulacral covering plates: Hudson, 12a
- Strophochetus, Chazy: Seely, 85, 86
- Stromatoporoids: Parks, 10
- Strophocrinus: Sardeson, 99
- Taconic fossils: Dana (J D), 86a; Walcott, 88, 88c
- Tennessee: Troost, 40, 43; Davidson Co.: Troost, 35c; Trilobita: Safford, 89b
- Tetradium, Canada: Raymond (P E), 13g
- Trenton fossils: Walcott, 76
- Kentucky: Wetherby, 80b, 81a, b
- Wolfe Island, Ont.: Mather, 17b
- Trenton and Black River formations, New York: Coryell, 16
- Trilobita: Billings, 70
- Beekmantown: Raymond (P E), 10
- Canadian: Raymond (P E), 13e
- Lowville and Black River formations: Raymond (P E), 10a
- Vermont Chazy: Raymond (P E), 10f
- Trocholites, Canada: Whiteaves, 04a
- Upper Mississippi Valley: Owen (D D), 40
- Utica fossils, Canada: Ami, 92d; Albany, N. Y.: Beecher, 83
- Utica slate fauna: Walcott, 83a
- Vermont: Billings, 61d; Dana (J D), 77a; Hitchcock (E), 61
- Addison Co.: Seely, 10
- Fort Cassin beds: Whitfield, 86, 97a
- Grand Isle: Perkins (G H), 02d
- Green Mountain region: Perkins (G H), 12
- Highgate Springs, Trenton: Ami, 96b
- Isle La Motte, Stromatoceria: Seely, 04
- Virginia: Rogers (W B), 82a
- Athens shale, graptolites: Powell (S L), 15
- Buckingham Co.: Darton, 92d
- Walker Mountain, Bays fauna: Grabau, 13b
- western: Bassler, 09
- Washington, Skykomish basin: Smith (W S), 16
- Wisconsin: Hall, 61c; Whitfield, 78, 80a, 82a
- Delafield, Bryozoa: Buell, 82
- lead region: Conrad, 43b
- Pelecypoda: Ulrich, 92a
- St. Croix River: Prout, 51a
- Trenton: Blake (W P), 94; Walcott, 79b; Whitfield, 95

**Pre-Cambrian**

- Algonkian algal flora: Walcott, 14, 15b
- Algonkian bacteria: Walcott, 15a
- Archean plant, Sussex Co., N. J.: Britton, 88a
- Atikokania lawsoni: Abbott (G), 14; Walcott, 14a
- Belt series: Walcott, 01b
- General: Dawson (J W), 96a; Walcott, 99a, 01b, 16
- Lake Superior region, iron-bearing rocks: Cayeux, 11
- Laurentian organic remains: Logan, 64a
- Laurentian rhizopods: Hunt, 64a

**Paleontology—Continued.****Pre-Cambrian—Continued.**

- Massachusetts, eastern: Hobbs (W E), 99
- Ontario, Laurentian rocks, supposed worm-burrows: Dawson (J W), 66a
- Steeprock fauna, Ont.: Walcott, 12a; Rothpletz, 15
- Tracks of organic origin in Animikie rocks: Matthew (G F), 90d
- Quaternary.**
- Aftonian mammalian fauna: Calvin, 09b
- Aftonian molluscan fauna: Shimek, 10b
- Alabama, Pleistocene flora: Berry, 07d, 10h
- Alaska, Equus skull: Hay (O P), 13a; Pleistocene: Maddren, 05
- Arctic: Jeffreys, 77
- Arkansas, Crowley's Ridge: Shimek, 16; northern: Brown (B), 05a
- Atlantic Coastal Plain, Pleistocene: Shattuck, 01
- Avian faunas of Pacific coast: Miller (L H), 12
- Baffinland, Pleistocene: Kindle, 97
- Bahamas: Dall, 05b
- Balanus, Pleistocene: Dawson (J W), 89c
- Beluga, Leda clay, Montreal: Dawson (J W), 95e; Ontario: Dawson (J W), 83b
- Bison, Klondike Creek gravels: Whiteaves, 03b
- Boulder clays, microscopic organisms in: Dawson (G M), 85a; Johnson (H A), 84
- British Columbia, drift: Lamplugh, 86; East Kootenay, Pleistocene flora: Hollick, 14
- Caddis fly, Leda clays, Ottawa: Scudder, 95c
- California, avifauna of cave deposits: Miller (L H), 11b
- cat allied to Felis atrox: Merriam (J C), 09
- Felidae: Bovard, 07
- Hawver Cave: Stock, 18
- Mammalia: Furlong, 06, 07; Merriam (J C), 06a, d
- Mohave Desert: Merriam (J C), 15g; horses: Merriam (J C), 13f
- myriapods and insects: Grinnell, 08
- peacock, asphalt beds: Miller (L H), 09
- pectens: Arnold, 06
- Pleistocene: Carpenter (P P), 66; Gidley, 06b; Oldroyd, 14; San Pedro, Bathytoma: Rivers, 13
- Potter Creek cave fauna: Sinclair, 04a
- Raccoon: Gidley, 06b
- Rancho La Brea fauna: Gilbert (J Z), 10; Matthew (W D), 13e; Merriam (J C), 11, 11a, 13; Wyman, 18
- Antelope: Taylor (W P), 11
- Aves: Miller (L H), 10a
- Bufo: Camp, 17
- camel: Merriam (J C), 13a
- Canidae: Merriam (J C), 12
- Carnivora: Merriam (J C), 12a
- horses: Merriam (J C), 13e
- Nothrotherium: Stock, 17
- Teratornis: Miller (L H), 09a
- wading birds: Miller (L H), 10
- rodents: Kellogg, 12
- San Diego, Actaeon: Stearns, 97, 98
- Shasta Co., Samwel Cave: Furlong, 04
- tapir, Cenozoic: Merriam (J C), 13



**Paleontology—Continued.****Quaternary—Continued.**

- Camptothecium, Kansan drift, Iowa: Grout (A J), 17
- Canada: Billings, 561; Dawson (J W), 71a
- Mollusca: Bell (R), 61
- Pleistocene flora: Penhallow, 96, 07a; and fauna: Coleman, 99e
- Carabidae, interglacial, Toronto, Ont.: Scudder, 77a
- Cardium, Pleistocene, Hudson's Bay: Stimpson, 62
- Caribou, Iowa: Leidy, 79
- Castoroides: Martin (H T), 13
- Clyde, N. Y., geological horizon: Hall, 46
- Ohio: Newberry, 74r
- Cave deposit in California: Furlong, 07
- Cave mammals: Cope, 69g
- Cervalces, New Jersey: Scott (W B), 85
- Cetacea from Pleistocene: Perkins, 08, 10
- Chlamytherium septentrionalis, Florida: Sellards, 15c
- Coleoptera, Port Kennedy bone cave: Horn, 76; Toronto, interglacial clay: Scudder, 00a
- Correlation of Cenozoic: Osborn, 10a
- Cuba: Brown (B), 13a; Torre, 12a
- eastern, Pleistocene: Vanatta, 12
- Mammalia: Torre, 10a, b
- Dicotyles, Ohio: Klippart, 75; Newberry, 74p
- Distribution of Pleistocene Mammalia: Hay (O P), 09d
- Drift fossils: Desor, 47b, 50h
- Equus, Kansas: Swallow, 66c
- Missouri: Broadhead, 73e
- Yukon: Hay (O P), 17a
- Equus beds fauna: Cope, 89b
- Erethizon, Arizona: Allen (J A), 04
- Felidae, California: Bovard, 07
- Foraminifera, Atlantic slope: Bagg, 98b
- Florida, Pleistocene: Sellards, 16a
- Vero: Berry, 17g; Hay (O P), 17b; Sellards, 17b; Plantae: Berry, 17i; Vertebrata: Hay (O P), 16b, 17c; Sellards, 16
- General: Osborn, 15b
- Glyptodont, Mexico: Brown (B), 12, 12c
- Greenland: Jensen, 17; Mollusca: Jensen, 09
- Pleistocene: Kindle, 97
- Hawaii, Amastra: Cooke (C M), 17
- Helicina occulta: Shimek, 04d, 05; distribution: Keyes, 89i
- Illinois: McAdams, 84
- Chicago area, Pelecypoda: Baker, 93
- drift fossils: McAdams, 83a
- Galena, Mammalia: Leidy, 62
- postglacial Mollusca: Baker (F C), 15, 18
- Sangamon peat, beetles: Wickham, 17
- Indiana, Evansville, Mammalia: Leidy, 54f
- Mollusca, old forest bed: Billups, 02
- Posey Co.: Daniels, 05
- post-Pliocene: Cope, 84a
- Vertebrata: Hay (O P), 12
- Iowa, Aftonian mammalian fauna: Calvin, 10, 11
- Harrison and Monona cos.: Shimek, 10
- loess Mollusca: Call, 81; Keyes, 88, 89d; Shimek, 88, 90, 01, 01b, 10b

**Paleontology—Continued.****Quaternary—Continued.**

- Iowa, plants: MacBride, 07
- Pleistocene Mammalia: Hay (O P), 14
- western, Vertebrata: Calvin, 09d
- Kansas, Equus beds: Hay (O P), 17e
- Phillips Co., Pleistocene Mollusca: Hanna, 13
- Pleistocene: Williston, 97a, 98c
- Kentucky, Mississippi Bluffs, Pleistocene flora: Berry, 15b
- Labrador: Dawson (J W), 60c; Packard (A S), 67
- Land and fresh-water Mollusca, Defiance, Ohio: Sterki, 07
- Loess fossils: McGee, 82; distribution: Shimek, 99
- Louisiana, Petite Anse, Mammalia: Cope, 95f
- Lower California: Böse, 07
- Lymnaeidae of North and Middle America: Baker (F C), 11
- Mammal horizons of western North America: Osborn, 09
- Mammalia: Furlong, 06, 07; Hay (O P) 15, 16c; Merriam (J C), 06a, d
- Arkansas: Brown (B), 08
- drift deposits, horizon: Newberry, 74j
- Kansas and Oklahoma: Cope 95b
- Maine: Dawson (J W), 60c; Hitchcock (C H), 62a; Packard (A S), 67
- glacial: Sherman, 73
- Mollusca: Mighels, 42
- Mount Desert Island, Blaney, 16
- Pleistocene plants, marine clays: Berry, 17c
- Portland region: Hitchcock (C H), 74g
- Waterville: Little (H P), 17a
- Marine shells in Lake Ontario region: Desor, 51a
- Maryland: Clark (W B), 06
- Cumberland, Pleistocene cave deposit: Gidley, 13c
- flora: Hollick, 06f
- Indian Head, Pleistocene plants: Berry, 15f
- Juglandaceae, Pleistocene: Berry, 09c
- Massachusetts, Boston area: Shimer, 15, 18; Upham, 92, 94e; recent Mollusca: Niles, 69
- Boston Basin, drumlins: Crosby, 94a
- Chelsea, post-Pliocene: Stimpson, 51
- Fort River, Pleistocene beetles: Scudder, 98
- Gloucester: Shaler, 66d
- Nantucket: Cushman, 04b; Wilson (J H), 05; Sankaty Head: Cushman, 06; Pleistocene: Wilson (J H), 05; post-Pleistocene: Scudder, 76d
- Winthrop: Dodge (R E), 94b
- Mastodon, Kansas: Hay (O P), 17
- Orange Co., N. Y.: Gordon (R), 02
- Mexico, Lower California, Pleistocene Mollusca: Dall, 18a
- Mammalia: Castillo, 69a
- Valle de Oaxaca: Conzatti, 08
- Valley of Mexico: Villada, 03, 10
- Minnesota, Pleistocene Mammalia: Winchell (N H), 10
- Mississippi Valley, Mammalia: Wyman, 62
- Missouri, Calloway Co., Pleistocene Mollusca: Greger, 16
- post-Pliocene Mollusca: Sampson, 14
- southwestern: Lewis (J L), 80



## Paleontology—Continued.

## Quaternary—Continued.

- Mollusca, associated with Mastodon: Stearns, 00b  
 Colorado Desert: Stearns, 79  
 Great Basin: Call, 85  
 loess: Shimek, 98  
 list: Dall, 85  
 marl deposits, Aroostook Co., Maine: Nylander, 01  
 Nebraska, Cass Co., Dinartotherium: Barbour, 16b  
 Geomys from loess: Leidy, 67a  
 Mylodon garmani: Allen (G M), 13  
 Pleistocene: Matthew (W D), 02f, 18  
 Tetrabelodon: Barbour, 17a  
 Nevada, Astor Pass, Mammalia: Merriam, 15f  
 New Brunswick: Chalmers, 85a  
 Bathurst: Paisley, 74  
 post-Pliocene: Matthew (G F), 74  
 New Jersey, Pleistocene flora: Berry, 10d;  
 Pleistocene Mollusca: Baker (F C), 03  
 New Mexico, ruminant, Pleistocene: Gidley, 06c  
 New York, Cayuga Valley: Maury, 08  
 Gardiner's Island: Smith (S), 65  
 post-Pliocene: Letson, 01  
 North Carolina, flora: Berry, 07c, 09b  
 Ohio, land and fresh-water Mollusca: Sterki, 07  
 Oklahoma, Pleistocene fauna: Troxell, 17b  
 Ontario, Cervalces antler from Toronto interglacial: Bensley, 13  
 Don Valley, Pleistocene: Penhallow, 99;  
 Plantae: Penhallow, 05a  
 Green's Creek, Pleistocene: Dawson (J W), 90f  
 Iroquois beach: Coleman, 99d  
 Leda clays, Estheria: Packard (A S), 81a  
 Mackay Lake, Mollusca: Whittaker, 18  
 Nottawasaga River, Mollusca: Chapman (E J), 61b  
 Ottawa district: Ami, 84, 92a, 97a, 01; Leda clays, Insecta: Ami, 95d  
 Pleistocene echinoderm: Dawson (J W), 99  
 Russell Co., Phoca: Grant (J A), 83  
 Scarboro, interglacial: Scudder, 90g  
 Toronto: Coleman, 94, 13c; Penhallow, 00a  
 Unionidae: Simpson, 93  
 Ophiuroids in glacial clay of Maine coast: Sayles, 09  
 Oregon, Fossil Lake avifauna: Miller (L H), 11; Shufeldt, 13a  
 Pleistocene: McCornack, 14  
 tapir, Cenozoic: Merriam (J C), 13  
 Ostracoda, Quebec and Maine: Brady, 71  
 Ovibos, loess, Iowa: McGee, 87  
 Ovibos cavifrons, West Virginia: Hatcher, 02e  
 Ovibos tooth, Midway, B. C.: Lambe, 07a  
 Palauchenia, Mexico Valley: Owen (R), 70a  
 Panama: Brown (A P), 13; and Costa Rica: Dall, 12a  
 Paramylodon, Pleistocene, Nebraska: Brown (B), 03  
 Pectens: Arnold, 06  
 Pennsylvania, bone caves: Leidy, 80  
 Pleistocene fauna, Frankstown: Holland, 08a  
 Port Kennedy: Cope, 71m, 99; Mercer, 99  
 Rhinoceroses: Featherstonhaugh, 31

## Paleontology—Continued.

## Quaternary—Continued.

- Phoca, Russell Co., Ont.: Grant (J A), 83  
 Plants: Newberry, 54  
 Platygonus, Kansas: Peterson, 14b; Mexico: Dugès, 87  
 Pleistocene faunas: Hay (O P), 12b  
 Pleistocene flora, Southern States: Berry, 14d  
 Pleistocene fossils, list of, in northeastern New England: Clapp (F G), 08  
 Pleistocene mollusks, significance: Shimek, 13  
 Pleistocene ruminants: Gidley, 08  
 Postglacial fossils: Olsson-Seffer, 03  
 Postglacial Mollusca, Michigan and Wisconsin: Baker (F C), 13a  
 Potter Creek cave fauna: Sinclair, 03c  
 Preptoceras, Texas: Troxell, 15a  
 Proboscidea, Pleistocene, occurrence: Udden, 05  
 Pyrgulopsis scalariformis: Shimek, 92  
 Quebec, Anticosti, Pleistocene: Grant (C E), 86  
 Mollusca: Lyell, 41  
 Montreal: Dawson (J W), 57a; Stansfield, 15;  
 marine shells: Logan, 46b  
 Murray Bay: Dawson (J W), 61b  
 Ostrea, Pleistocene, Montreal: Ardley, 12  
 Ottawa district: Ami, 01  
 Riviere-du-Loup: Dawson (J W), 65  
 St. Lawrence Valley, Pliocene: Dawson (J W), 58c; post-Pliocene: Dawson (J W), 59c  
 Shells of marls: Walker (B), 03  
 South Carolina: Pugh, 05  
 Pleistocene Mollusca: Pugh, 05; post-Pliocene: Holmes (F S), 60  
 South Dakota, interglacial mollusks: Baker (F C), 13b  
 Stickleback fish, Nevada: Hay (O P), 07a  
 Succinidae of loess, variation: Shimek, 94  
 Symboes cavifrons, Michigan: Case, 15c  
 Tapir, Pleistocene, Florida: Sellards, 18b  
 Texas, alligator snapper: Hay (O P), 11  
 Dallas Co.: Shuler, 18  
 Pleistocene, Xenarthra: Hay (O P), 16  
 Vertebrata: Hay (O P), 16a  
 Tilia, New Jersey: Berry, 07a  
 Ursus, Ohio: Miller (G S), 99  
 Utah, musk-ox skull: Chadbourne, 71; Walker Lake, horses: Merriam (J C), 13f  
 Virginia, plants: Berry, 06h; Pleistocene plants, Blue Ridge: Berry, 12d  
 Washington: Sternberg, 81b; northwestern: Reagan, 07  
 West Virginia, Morgantown, plants: Knowlton, 96c  
 Wisconsin, Cristivomer: Hussakof, 16c; Pleistocene Mollusca: Baker (F C), 00  
 Yukon, Arctotherium, Pleistocene: Lambe, 11  
*Silurian.*  
 Alaska, southeastern: Kindle, 07  
 Alberta, Lake Winnipegosis region: Whiteaves, 91b  
 Alexandrian series, Illinois and Missouri: Savage, 13a, 14a; northeastern Illinois and eastern Wisconsin: Savage, 16a  
 Anthozoa, Niagaran: Hall, 84f  
 Anticosti Island faunas: Twenhofel, 14  
 Arctic Archipelago: Haughton, 59



## Paleontology—Continued.

## Silurian—Continued.

- Arctic regions: Etheridge, 78; Haughton, 57, 60; Lambe, 10; Salter, 52, 53; Schuchert, 14f; Whitfield, 00a
- Ellesmere Land: Hortedahl, 14
- Frobisher Bay: Stevens, 63
- Kennedy Channel: Meek, 65d
- Arisaig series, Nova Scotia: McLearn, 18a
- Arkansas, Batesville: Van Ingen, 01
- Baffin's Bay region: Salter, 52
- Bibliographic index: Bassler (R S), 15a
- Blastoidea: Roemer, 51
- Bryozoa: Rominger, 66; Ulrich, 90c
- James types: Bassler, 06; Rochester shale: Bassler, 06a
- Calceolidae, Kentucky: Lyon, 79
- Calymene, Georgia: Vogdes, 80
- Calymene nasuta, Osgood, Ind.: Ulrich, 79b
- Camerate crinoids, Niagara group: Wachsmuth, 92
- Canada: Billings, 56k, 58d, 60b; Whiteaves, 06
- Brachiopoda: Billings, 59a
- Hudson Bay region: Savage, 18a
- Ostracoda: Jones (T R), 91
- Plantae: Dawson (J W), 71b
- Catalog of fossils: Bigsby, 68
- Cerionites: Calvin, 93a
- Clinton, New York: Chadwick, 18
- (Brassfield), Ohio: Foerste, 85, 93; Meek, 72e
- Conularia, Hamilton, Ont.: Anon, 79
- Crinoidea, Chicago area: Slocum, 07a
- Lockport shales, N. Y.: Ringueberg, 82a
- Waldron, Ind.: Springer, 02
- Crotalocrinus: Weller, 02a
- Crustacea, Nova Scotia: Dawson (J W), 77g
- Cystidea: Schuchert, 04a
- Clinton of Ontario: Parks, 10a
- Dalmanites, New York: Barrett, 76
- Eucalyptocrinus, Niagaran, Ill.: Miller (S A), 80e
- Eurypterus fauna, Shawangunk grit, New York: Clarke (J M), 07c, e
- Franklin: Ami, 06
- General: Castelnau, 43; Conrad, 42a; Sharpe, 48; Weller, 98d
- Georgia, Clinton group: Foerste, 89a; Tritobita: Vogdes, 86a
- Girardeau and Edgewood formations: Savage, 10b
- Graptolites, New York: Ruedemann, 08
- Niagara formation, Hamilton, Ont.: Spencer (J W), 78
- Niagaran dolomites, Hamilton, Ont.: Bassler, 09b
- Quelph fauna: Nicholson, 75i; Whiteaves, 06c
- New York: Clarke (J M), 03f
- Gastropoda: Nicholson, 75e
- Halysites, Iowa: Whitfield, 03a
- Hillsboro sandstone, Ohio: Prosser, 16b
- Holocystites, Niagaran, Ind.: Miller (S A), 92b
- Illinois: Miller (S A), 82e
- Chicago area, Crinoidea, Niagaran: Weller, 00c
- Invertebrata: Meek, 68, 75b
- Niagaran: Miller (S A), 82b
- northern, Medusae (Cryptodiscus): Weller, 97b

## Paleontology—Continued.

## Silurian—Continued.

- Illinois: Orchard Creek shale: Savage, 18b
- Indiana: Foerste, 09, 09b; Greene (G K), 98; Miller (S A), 92, 94b; White (C A), 78e, 82b
- Anthozoa, Niagaran: Hall, 83i
- Clinton: Foerste, 89a
- Jefferson Co.: Cornett, 75
- Lituities: Whitfield, 85b
- Mysticocrinus: Springer, 18
- Niagaran, Holocystites: Miller (S A), 78c, 79c
- northern: Schuchert, 04c; Cephalopoda: Newell, 88; Niagaran: Kindle, 04
- Waldron fauna: Hall, 82a, 83k; Kindle, 09d; Tarr Hole: Cumings, 00a
- Invertebrata: McChesney, 61, 67; Meek, 65j, 70d, 71f
- Iowa, Jones Co.: Weller, 96; Cyathophyllum: Thomas (A O), 17
- Monticello, Crinoidea: Thomas (A O), 15
- Niagaran, Cephalopoda: Thomas (A O), 15a
- Scott Co.: Tiffany, 85
- Kentucky: Foerste, 09, 09b
- Louisville region: Hall, 72; Yandell, 47
- Mollusca and Brachiopoda: Nettleroth, 89
- Kentucky and Tennessee: Foerste, 01
- Leclaire beds fauna: Norton, 95c
- Little River group flora: Matthew (G F), 11
- Maine: Billings, 69; Williams (H S), 00
- Cobscook Bay: Shaler, 86
- Dennis River: Rogers (W B), 61e
- Eastport quadrangle: Bastin, 14; Williams (H S), 12b, 13b
- Nuculites: Williams (H S), 17
- Washington Co., Edmunds and Pembroke formations: Williams (H S), 13a; Mollusca: Williams (H S), 12; Spirifer: Williams (H S), 16a
- Manitoba: Billings, 59i; Calvin, 92a; Whiteaves, 80; Saskatchewan River valley: Kindle, 15a
- Manlius fauna, Erie Co., N. Y.: Grabau, 00b
- Michigan: Sherzer, 09
- Limestone Mountain, Houghton Co.: Case, 15a
- Upper Peninsula: Hall, 51c; Savage, 18
- Missouri, Alexandrian series: Savage, 13; Echinodermata: Rowley, 04
- Mollusca: Conrad, 46
- Monroe fauna: Grabau, 10
- Nettleroth collection: Bassler, 09b
- Nevada, Ethmophyllum: Meek, 68b
- New Brunswick, fish: Matthew (G F), 07
- Niagara coral reefs: Honeyman, 74b
- plants: Matthew (G F), 07a
- Pteraspis: Matthew (G F), 86b, 87a
- Silurian flora: Matthew (G F), 10d
- southern: Eells, 12; Matthew (G F), 89b; flora: Matthew (G F), 12a
- New Hampshire, Littleton: Pumpelly, 88
- New Jersey: Weller, 03; Montague: Barrett (S T), 78a
- New York: Bigsby, 58; Hall, 52
- Becraft Mountain, Columbia Co.: Grabau, 03
- Brachiopoda: Beecher, 89
- Clinton fauna: Ringueberg, 82
- Cobleskill limestone: Hartnagel, 03



**Paleontology—Continued.****Silurian—Continued.**

- New York: eurypterid fauna: Sarle, 03  
 Eurypterid fauna: Clarke (J M), 07c, e  
 Gastropoda: O'Connell, 14a  
 Niagara Bryozoa: Bassler, 06a  
 Niagara Falls region: Grabau, 01  
 Niagaran: Ringueberg, 82, 84, 86, 88a: Crinoida: Ringueberg, 90  
 Onondaga Co.: Schneider, 94  
 Orange Co., Trilobite Mountain: Shimer, 05  
 Port Jervis: Barrett, 78  
 Rondout: Van Ingen, 03  
 Rochester shale: Bassler, 06a  
 Schoharie Valley: Grabau, 06  
 western: Hall, 43  
 Niagara fauna: Hall, 52, 67e, 71a  
 Niagaran, Illinois: Miller (S A), 80a, 81a c, d, 82d; Chicago: Winchell (A), 66a  
 Indiana: Hall, 76; Waldron: Hall, 83c; Miller (S A), 78  
 stromatoporoids: Parks, 08  
 Nova Scotia, Antigonish Co.: Ami, 95a  
 Arisaig: Ami, 92; Billings, 74; Twenhofel, 09, 13; Palaeaster: Billings, 60c  
 eastern: Honeyman, 60  
 Pictou region: Dawson (J W), 80d; Honeyman, 80b  
 plants: Matthew (G F), 07a  
 Ohio: Foerste, 09, 17a; James (U P), 78  
 Anthozoa: Nicholson, 75a  
 Clinton: Foerste, 89a  
 Darke Co.: Lindemuth, 78  
 Green Co., Helicopora: Claypole, 83  
 Invertebrata: Hall, 75a; Meek, 73b  
 Preble Co.: Orton, 78  
 Oklahoma, Hunton formation: Reeds, 11; McAlester coal field: Girty, 99  
 Ontario: Billings, 56d, 74a; Grant (C C), 06, 07; Nicholson, 74b, 75  
 Albany River region: Whiteaves, 09a  
 Brachiopoda: Billings, 56g  
 Ekwon River region: Whiteaves, 04  
 Eramosa beds: Williams (M Y), 15a  
 Guelph: Whiteaves, 84, 95; Gastropoda: Nicholson, 75e  
 Hamilton: Grant (C C), 94, 95, 99, 01, 03, 04, 05; graptolites: Spencer (J W), 83a; Plantae: Grant (C C), 92  
 Lake Ontario, western end: Spencer (J W), 82  
 Niagara: Spencer (J W), 84  
 Ottawa region: Ami, 96a; Salter, 52a  
 Patricia: Parks (W A), 13, 15  
 Osgood fossils: Foerste, 04b  
 Ostracoda: Ulrich, 90f  
 Pennsylvania: Simpson (G B), 90  
 Ostracoda: Jones (T R), 89  
 Pisces: Claypole, 85a  
 Pisces: Newberry, 89  
 Pterygotus, Hamilton, Ont.: Dawson (J W), 79d  
 Quebec, Anticosti Island: Billings, 65b, 66; Brachiopoda: Shaler, 65  
 Gaspé: Billings, 74  
 Montreal area: Ami, 96  
 Nipissing-Timiskaming area: Ami, 99  
 Stromatopora, Ontario: Nicholson, 73a, 74d

**Paleontology—Continued.****Silurian—Continued.**

- Stromatoporoids: Parks, 09b; Guelph, Ontario: Parks (W A), 07; Hudson's Bay: Parks, 08c; Niagaran: Parks, 08  
 Syringolites, Manitoulin: Hinde, 79b  
 Tennessee: Foerste, 09b; Roemer, 60a; Troost, 40  
 Calceola: Safford, 60a  
 Clinton: Foerste, 89a  
 Decatur, Spongida: Roemer, 48c  
 western: Roemer, 60  
 Trilobita, Chicago area: Weller, 07a  
 Trimerella, Keewatin: Whiteaves, 02a  
 Trochoceras grovaniense: Mook (R R), 15  
 Upper Mississippi Valley: Owen (D D), 40  
 Waldron fauna: Hall, 64b, 76, 83k  
 Wisconsin: Hall, 61c; Whitfield, 80a, 82a  
 Niagara fauna: Day (F H), 78; Hall, 60g, 67e, 71a  
 operculated gastropod: Teller, 10  
 trilobites: Raymond (P E), 16a

**Tertiary.**

- Alabama: Aldrich, 86, 86a; Langdon, 86; Tuomey, 58a  
 Claiborne fauna: Aldrich, 08; Heilprin, 79; Lea (I), 33; Lea (H C), 41; Mell, 80; Wheeler (H E), 10  
 Clarke Co., Eocene: Heilprin, 81  
 Eocene: Conrad, 60b; Meyer (O), 87a  
 Cancellaria: Aldrich, 97a  
 Echinoidea: Morton, 46a  
 Mollusca: Aldrich, 98; Meyer (O), 87; Whitfield, 65  
 Mollusca: Aldrich, 85a, 03  
 Alabina from west coast: Bartsch, 11  
 Alaska: Dall, 04; Eichwald, 71  
 floras: Hollick, 11c  
 Kukak Bay, plants: Knowlton, 04  
 Miocene flora: Lesquereux, 83a  
 Alberta, Cypress Hills, Vertebrata: Cope, 91a  
 Alum Bluff flora: Berry, 16b  
 Alvanina from west coast of America: Bartsch, 11d  
 American Eocene horses: Granger, 08  
 Anconodon: Matthew (W D), 09a  
 Anomalofilicites, Dawson Co., Mont.: Hollick, 16  
 Anthozoa: Vaughan, 00a  
 Antigua: Brown (A P), 14; fresh-water mollusks: Brown (A P), 14a  
 Apalachicola fauna, Lower California: Arnold, 17b  
 Apternodus, skull: Matthew (W D), 10  
 Arca, revision: Heilprin, 82  
 Arcas, Atlantic slope: Sheldon, 17  
 Arctic regions, Ellesmere Land, plants: Nathorst, 15  
 Arkansas: Veatch (A C), 06e  
 Plantae: Lesquereux, 60  
 southern: Harris, 94  
 Assiniboia, Oligocene horses: Lambe, 06e; Hyracodon: Lambe, 06d  
 Atlantic coast province: Brown (T C), 07a  
 Atlantic Coastal Plain: Conrad, 35b, 42b; Olson, 14; Eocene fauna: Clark (W B), 95g  
 Atlantic slope: Clark (W B), 96a



**Paleontology—Continued.****Tertiary—Continued.**

- Birds: Marsh, 70; from Wasatch: Loomis, 06a  
 Bittium from west coast of America: Bartsch, 11c  
 Bridger fauna, Vertebrata: Leidy, 73  
 British Columbia, floras: Dawson (J W), 83a  
 Insecta: Scudder, 79b; Tertiary lake deposits: Handlirsch, 10  
 Kettle River region plants: Penhallow, 09d  
 Lebeophyllum: Wilson (W J), 13  
 Miocene, *Leuciscus rosei*: Hussakof, 16b  
 plants: Penhallow, 08b  
 Queen Charlotte Islands, invertebrates: Burwash, 14  
 Quesnel, Insecta: Scudder, 77b, 78b  
 southern, plants: Dawson (J W), 79b  
 Vancouver City, plants: Dawson (J W), 95b  
 Vancouver Island: Merriam (J C), 96a; Gastropoda: Merriam (J C), 97a; plants: Heer, 59  
 Brittle star, Miocene, Santa Cruz Mountains, Cal.: Arnold, 08e  
 Bryozoa: Gabb, 62; Cheilostomata: Canu, 17  
 Busycon, Oligocene, Florida: Aldrich, 07  
 California: Arnold, 03; Gabb, 69; Cooper (J G), 94; Stanton, 96  
 Alabina: Bartsch, 11  
 Alvania: Bartsch, 11d  
 auriferous gravel deposits, plants: Lesquereux, 78c  
 Bittium: Bartsch, 11c  
 Carrizo Creek, coral fauna: Vaughan, 17  
 Cephalopoda: Trask, 56b  
 Cerithiopsis: Bartsch, 11b  
 Chanac formation: Merriam (J C), 16c  
 Coalinga district: Arnold, 09a, 10; Nomland, 16a  
 Colorado Desert, Echinoidea: Kew, 14  
 Contra Costa Co.: Rémond, 63; Echinoidea: Rémond, 63b  
 Diastoma: Bartsch, 11a  
 Echinoidea: Merriam (J C), 99; Weaver, 08  
 Eocene horizons: Waring (C A), 14; Martinez fauna: Dickerson, 14a  
 Fernando group: English, 14  
 Foraminifera: Chapman (F), 00  
 Gastropoda: English, 14a; Stearns, 76  
 Invertebrata: Conrad, 56b; catalog: Cooper (J G), 71  
 Los Angeles, Fernando fauna: Moody, 16  
 Mammalia, Mohave Desert: Merriam (J C), 11b  
 Martinez fauna: Waring (C A), 17; Weaver, 05  
 Marysville Buttes Eocene fauna: Dickerson, 13  
 middle and northern, Pliocene: Martin (B), 16  
 Miocene: Merriam (J C), 04; flounder: Gilbert (J Z), 10a; invertebrates: Smith (J P), 12b  
 Mohave Desert: Merriam (J C), 15g; horses: Merriam (J C), 13g  
 Mollusca: Conrad, 55, 56, 56a, 57; Dall, 74, 79a, b  
 Monterey series: Bagg, 05; Martin (B), 12  
 Neocene areas: Osmont, 05a  
 Neocene Mollusca: Martin (B), 14  
 North Coalinga region: Merriam, (J C), 15b

**Paleontology—Continued.****Tertiary—Continued.**

- California: pectens: Arnold, 06  
 Pisces: Agassiz (L), 55, 57  
 Pleistocene, Aves: Miller (L H), 14  
 Pliocene: Nomland, 17a  
 crab: Rathbun, 17a  
 flora from Coast Ranges: Hannibal, 11  
 fresh-water Mollusca: Cooper (J G), 94a  
 Jacalitos Creek: Nomland, 16b  
 Ostracoda: Chapman (F), 96  
 Pliocene and Pleistocene Foraminifera: Bagg, 12  
 raccoon: Gidley, 06b  
 Rock Creek area: Dickerson, 14c  
 San Diego: Orcutt, 89a, b  
 San Francisco district: Lawson, 14  
 San Jose region, Mollusca: Hall (E B), 16  
 San Juan district: Anderson (F M), 14  
 San Lorenzo series: Clark (B L), 18b  
 San Luis Obispo, Miocene: Gabb, 64d  
 San Pablo group, echinoids: Kew, 15  
 San Pedro: Arnold, 03  
 Santa Barbara Co., Mollusca: Arnold, 08  
 Santa Clara lake beds, *Carinifex*: Hannibal 09  
 Santa Cruz Mountains: Arnold, 08d; Neocene Ashley, 96  
 Santa Margarita beds: Nomland, 17b  
 Santa Maria district: Arnold, 07f  
 Scutella and Scutaster: Pack, 13  
 southern: Arnold, 07, 07b  
 Summerland district: Arnold, 07d  
 Tehachapi region: Buwalda, 16  
 Tejon fauna: Dickerson, 14, 16  
 Tejon Hills, marine faunas: Clark (B L), 16  
 Temblor Basin: Anderson (F M), 14  
 California province, fresh-water Mollusca: Hannibal, 12  
 Calvert flora: Berry, 16c  
 Camel, lower Miocene, Nebraska: Cook (H J), 09  
 Caribbean region: Guppy, 09  
 Carnivora, John Day region: Merriam (J C), 06b  
 Carnivora and Insectivora, Bridger Basin Eocene: Matthew (W D), 09  
 Carnivora, Nebraska Miocene: Peterson, 10  
 Carrizo Creek fauna, Cal.: Dickerson, 18  
 Catahoula sandstone flora: Berry, 16e  
 Cerithiidae, phylogeny: Wood (Elvira), 10  
 Cerithiopsis from west coast of America: Bartsch, 11b  
 Claiborne fauna: Harris, 95  
 Clallam formation: Reagan, 10  
 Chavilithes, Eocene, Texas: Johnson (C W), 02  
 Colorado, Denver Basin, vertebrates: Marsh, 96a  
 Denver formation: Cross, 89  
 Florissant: Bather, 09; Brues, 06, 08, 08a, b, 10; Calvert, 13; Cockerell, 06-06h, 07-07k, 08, 08a, b, e, f, i, 09a-e, n, 10, 10a, b, e, f, g, 11, 11a, e, 12c, 13, 13d, e, 14f, 17, 17a; Hollick, 07, 09; Johannsen (O A), 12; Kirkaldy, 10; Knowlton, 16b; Rohwer, 08, 08a, b, c, 09, 09a, b; Scudder, 81, 84b; Wheeler (W M), 06; Wickham, 08, 09, 10, 11, 12, 12a, 13, 13a, 14, 16, 16a, 17a



## Paleontology—Continued.

## Tertiary—Continued.

- Colorado: Huerfano Basin: Osborn, 97  
 Insecta: Scudder, 78  
 Paleocene bat: Matthew (W D), 17a  
 Physopoda: Scudder, 75a  
 Plantae: Lesquereux, 74b, 78b  
 Raton flora: Knowlton, 17  
 San Juan Basin: Granger, 17  
 Vertebrata: Cope, 73a  
 Conus, Florida: Aldrich, 03a  
 Correlation of Cenozoic: Osborn, 10a  
 Costa Rica: Gabb, 81; Romanes, 12  
 Bryozoa: Canu, 18a  
 Chiriqui: Gabb, 60j  
 Pliocene: Gabb, 81a  
 Corals, California and Oregon: Nomland, 16  
 Cordilleran region: Meek, 77  
 Crabronidae, Florissant, Colo.: Cockerell, 10c  
 Crabs, California: Rathbun, 08  
 Diastoma from west coast: Bartsch, 11a  
 Diceratherium cooki: Peterson, 11b  
 Dinosaurs, Colorado: Lee (W T), 13b; Denver  
 beds: Cannon, 89a  
 Diploceras, Uinta Eocene: Peterson, 14  
 Dolichorhinus, Uinta beds: Peterson, 14c  
 Dolphin, California: Lull, 14  
 Dromomeryx: Douglass, 09b  
 Drumfish, Miocene: Smith (B), 09  
 Duplin fauna: Gardner (J A), 15  
 Eagle Creek flora, Columbia River gorge:  
 Chaney, 18  
 Echinids: Stefanini, 12; California: Pack, 09  
 Echinodermata: Clark (W B), 15  
 Ephora, Chesapeake Miocene: Pilsbry, 11a  
 Edentate-like remains: Sinclair, 06  
 Engelhardtia, Eocene: Berry, 11i  
 Eocene: Conrad, 46a, 47; Matthew (W D), 14b, e  
 Alabama: Cossmann, 93; Gregorio, 90; Meyer  
 (O), 86; and Mississippi: Aldrich, 08a  
 Astarte, Mississippi: Aldrich, 10  
 Atlantic Coastal Plain: Lonsdale, 45b; Lyell,  
 45b  
 Atlantic slope: Clark (W B), 96a  
 flora, southeastern North America: Berry, 14a  
 Green River: Cockerell, 09j  
 Gulf States: Aldrich, 11  
 Insects, Colorado: Cockerell, 08u, 09f  
 Invertebrata, catalog: Conrad, 65a  
 lower, floras: Berry, 16a  
 Maryland: Clark (W B), 01a  
 middle Atlantic slope: Clark (W B), 95d  
 Mollusca: Aldrich, 97; Conrad, 65f; Johnson  
 (C W), 99  
 Alabama: Aldrich, 07a  
 Gulf States: Harris, 96a  
 southern states: Aldrich, 10a  
 vertebrates, Bridger Basin, Wyo.: Osborn, 78  
 Eocene and Oligocene, catalog: Conrad 66  
 Equidae, revision: Gidley, 07a; Osborn, 18  
 Eschara, Eocene, Alabama: Lea, 52  
 Euphorbiaceae: Cockerell, 09l  
 Eusmilus, Oligocene, South Dakota: Hatcher,  
 95a  
 Evolution and distribution of Tertiary faunas:  
 Dall, 09a

## Paleontology—Continued.

## Tertiary—Continued.

- Evolution and migrations of mammals: De-  
 péret, 08  
 Felidae, phylogeny: Matthew (W D), 10b  
 Fish teeth, Richmond, Va.: Wyman, 50c  
 Florida: Dall, 90; Heilprin, 87a; Schuchert,  
 04d; Vaughan, 10c  
 Anastasia Island: Say, 24  
 Eocene, Tampa Bay: Conrad, 46  
 Miocene snails: Pilsbury, 97a  
 Mollusca: Aldrich, 03  
 Ocala limestone: Cooke (C W), 15  
 Oligocene Mollusca: Maury, 10; Tampa:  
 Dall, 15  
 Tomistoma: Sellards, 15b  
 Vertebrata: Sellards, 16  
 Volusia Co., Mollusca: Mansfield (W C), 18  
 Walton Co., Choctawhatchee marl: Mans-  
 field (W C), 16  
 Floras of Atlantic and Gulf Coastal Plain:  
 Berry, 11e  
 Foraminifera, Atlantic slope: Bagg, 98b;  
 Coastal Plain: Cushman, 18  
 Fort Union beds vertebrates: Douglass, 08  
 Fulgur: Maury, 09  
 Gastropoda, West: Cockerell, 15  
 General: Agassiz (L), 63h; Conrad, 57c, 77;  
 Cope, 84, 87c; Heilprin, 85c; Marcou,  
 58; Matthew (W D), 15; Meyer (O), 85a;  
 Osborn, 00h, i  
 Georgia: Bouvé, 51  
 Bainbridge: Vaughan, 00e  
 Claiborne and Jackson deposits: Cooke (C W),  
 18  
 Coastal Plain: McCallie, 08; Veatch (J O), 11a  
 Eocene: Conrad, 50  
 Flint River, Oligocene: Dall, 16  
 flora: Berry, 14  
 Great Basin region: Meek, 60c  
 Greenland, Cape Dalton: Ravn, 08  
 Disco region: Brown (R), 75  
 eastern, Plantae: Heer, 74c  
 northern, Miocene flora: Heer, 70, 74a  
 Green Mountain region: White (C A), 77e  
 Haiti: Guppy, 76; Oligocene: Pilsbry, 10  
 Hell Creek and Ceratops beds faunas: Knowl-  
 ton, 09  
 Heterotitanops, Uinta beds: Peterson, 14a  
 Horse, Miocene: Loomis, 08a  
 Horses: Gidley, 06a; Lambe, 06e; North  
 Dakota and Montana: Douglass, 08b  
 Hyracodon: Lambe, 06d  
 Idaho, fresh-water fishes: Cope, 71e  
 oak wood, Pliocene: Schuster, 08  
 Payette flora: Knowlton, 98b  
 Pliocene fauna: Cope, 83m  
 Truckee group, Mollusca: White (C A), 83i  
 Insecta: Scudder, 90a  
 Invertebrata: Conrad, 55b; Gabb, 60b; Meek,  
 70d, 71, 71f; White (C A), 81e  
 Western States: White (C A), 77  
 Wyoming: Meek, 76e  
 Jamaica: Duncan, 65; Etheridge, 69; Moore  
 (J C), 63  
 Bowden fauna, Pelecypoda: Woodring, 17  
 Clarendon district: Duncan, 65  
 Eocene corals: Vaughan, 99



## Paleontology—Continued.

*Tertiary*—Continued.

- Jamaica: Mollusca: Guppy, 66, 73  
 John Day beds, Carnivora: Merriam (J C), 06b; Mollusca: Stearns, 06  
 Kansas fishes: McClung, 08  
 Lignitic flora: Lesquereux, 76a, c  
 Lignitic stage: Harris, 97, 99, 99c  
 Lizards, Oligocene: Douglass, 08c  
 Louisiana: Veatch (A C), 06e  
 Eocene, Goniopteris: Berry, 17b  
 New Orleans boring: Hilgard, 70a  
 northwestern: Vaughan, 96; Plantæ: Hollick, 99c  
 Loup Fork fauna: Cope, 77  
 Lymnaeidae of North and Middle America: Baker (F C), 11  
 Mammal horizons of North America: Osborn, 07, 09  
 Mammal-bearing beds in northwestern Nevada: Merriam (J C), 07a  
 Mammalia: Cope, 15; Leidy, 69; Osborn, 10; faunal lists: Matthew (W D), 09b  
 Sioux Co., Nebr.: Barbour, 05  
 South Dakota: Matthew (W D), 06c  
 White River beds: Osborn, 94  
 Marine faunas, Atlantic Coastal Plain, environment: Gardner (J A), 17  
 Martinez fauna, California: Dickerson, 14c, d; Waring (C A), 17  
 Martinique, Miocene Mollusca: Cossmann, 13  
 Maryland: Conrad, 30a; Heilprin, 80a; True (F W), 06  
 Calvert Cliffs: Conrad, 41b, 42  
 Chesapeake Bay: Meyer (O), 88a; Miocene: Palmer (W), 15  
 Mammalia: Cope, 67b  
 Miocene, Delphinodon: True, 12  
 Mollusca: Conrad, 30; Newton, 02  
 St. Marys Co.: Shattuck, 07a  
 southern: Clark (W B), 88a  
 Mascall beds, Edentate-like remains: Sinclair, 06; horse: Gidley, 06a; Mollusca: Stearns, 06  
 Massachusetts, Chappaquiddick Island: Brown (T C), 05  
 Marshfield: Jackson, 50f  
 Marthas Vineyard: Dall, 94a; Lyell, 43a; Cancer: Packard, 00a  
 Winthrop Head: Dodge (W W), 88  
 Mastodon, Loup Fork Miocene: Sternberg, 07a  
 Meganos group, Eocene, California: Clark (B L), 18  
 Merycochoerus: Douglass, 07  
 Merycoidodonts, Miocene, Montana: Douglass, 07a, b  
 Mesozoic and Cenozoic plants: Knowlton, 10a  
 Mexico: Böse, 06  
 Carnivora from Pliocene and post-Pliocene: Freudenberg, 10  
 Chiapas, Zuluzum, Miocene fauna: Engstrand, 10  
 northeastern: Dickerson, 17  
 Pliocene fauna, Tuxtepec: Böse, 05a  
 Tehuantepec: Böse, 10c; Pliocene fauna: Toula, 11  
 Tuxpam: Dickerson, 17d

## Paleontology—Continued.

*Tertiary*—Continued.

- Mexico: Tuxtepec, Oaxaca, Pliocene: Böse, 05a  
 Vera Cruz, Equidae: Cope, 86a  
 Midway stage: Harris, 96  
 Miocene: Hay (O P), 06  
 Astoria and Coos Bay, Oregon: Dall, 09b  
 Atlantic Coastal Plain: Lyell, 45a  
 catalog: Meek, 64d  
 Lymnaea: Cockerell, 08q  
 mammals, new locality for: Cockerell, 08p  
 Oregon: Condon, 06; Wortman, 06  
 Mollusca, catalog: Conrad, 62a  
 Plantae, Mackenzie River: Heer, 80a  
 Scala, Alaska: Dall, 08  
 South Dakota: Matthew (W D), 06c, 07  
 trees, Rocky Mountains: Cockerell, 10a  
 Virginia: Berry, 06e  
 Mississippi: Aldrich, 86, 86a; Langdon, 86; Tuomey, 58a; Wailes, 54  
 Eocene: Conrad, 60b; Meyer (O), 87a  
 Goniopteris: Berry, 17b  
 Mollusca: Conrad, 65e; Meyer (O), 87; Whitfield, 65  
 Jackson: Conrad, 55a  
 Meridian: Berry, 17  
 Mollusca: Aldrich, 85a, 03  
 Red Bluff, Gastropoda: Aldrich, 94  
 Vicksburg Mollusca: Casey, 03  
 Missouri River region: Meek, 60b, e, 61d, 76; catalog of invertebrates: Meek, 56d  
 Mitra, Florida: Aldrich, 10  
 Mollusca: Aldrich, 85b, 87; Conrad, 32, 38, 43, 46, 54a, 62, 62b, 66f; Gabb, 61f; Meyer (O), 84, 95; White (C A), 85a  
 Alabama and Texas: Aldrich, 95  
 catalog: Conrad, 65d; Lea (H C), 48  
 Eocene: Heilprin, 80  
 Miocene: Conrad, 66b, 68a  
 nonmarine: White (C A), 83k  
 Rocky Mountain region: Cockerell, 15h  
 southern States: Dall, 96a  
 western States: Cockerell, 12a; White (C A), 83a  
 Wyoming and Utah: White (C A), 77b  
 Montana: Meek, 57  
 Bull Mountain coal field: Woolsey, 17  
 liverwort, Fort Union beds: Knowlton, 08  
 Mollusca: Meek, 56c  
 Neocene lake beds: Douglass, 99  
 northeastern: Collier, 18  
 south central: Douglass, 02a  
 Vertebrata: Douglass, 03a  
 Moropus, skull: Barbour (E H), 08  
 Mosses: Britton (E G), 07  
 Murfreesboro stage of Miocene, Atlantic Coastal Plain: Olsson, 17  
 Nebraska: Barbour, 06f; Hayden, 59; Peterson, 06, 06b  
 Equus: Marsh, 68a  
 Meteoreodon: Barbour, 17b  
 Miocene camel: Peterson, 11  
 Miocene Carnivora: Peterson, 10  
 Miocene quarry: Peterson, 06b  
 northwestern: Hatcher, 94; Osborn, 08c  
 Poebrotherium, Oligocene: Troxell, 17  
 rhinoceros: Barbour, 06f; Cook (H J), 12, 12a, c



## Paleontology—Continued.

## Tertiary—Continued.

- Nebraska, Sioux Co.: Cook (H J), 12b; Pliocene: Sinclair, 15  
 suilline remains: Peterson, 06  
 vertebrates: Peterson, 06c  
 western: Peterson, 09  
 Neocene Anthozoa: Gane, 00  
 Nevada, aplodont rodent: Furlong, 10  
 Cedar Mountain region, Vertebrata: Merriam (J C), 16  
 Esmeralda flora: Knowlton, 00e  
 Mammalia: Merriam (J C), 14; Virgin Valley and Thousand Creek: Merriam (J C), 11c  
 rodent fauna, Virgin Valley and Thousand Creek: Kellogg, 10  
 New Jersey: Conrad: 68b; Whitfield, 85, 92  
 Atlantic City: Woolman, 90  
 Cumberland Co., Miocene: Heilprin, 87b  
 Eocene, Fasciolaria: Whitfield, 05b; Mollusca: Conrad, 65i  
 Eocene and Miocene fishes: Fowler, 11  
 Miocene Mollusca: Heilprin, 88b; and Crustacea: Whitfield, 94  
 Reptilia, Eocene: Cope, 72j  
 New Mexico, Eocene Vertebrata: Cope, 75b, 76c, 82  
 Mollusca: Cockerell, 14  
 Plantae: Lesquereux, 72  
 Puerco and Torrejon faunas: Gardner (J H), 10e  
 Puerco beds: Hay (O P), 05b  
 Raton flora: Knowlton, 17  
 San Juan Basin: Granger, 17  
 Vertebrata: Cope, 74d, 77  
 New York, Long Island: Gratacap, 14  
 Nipadites, Mississippi, Eocene: Berry, 14e  
 North Carolina, Coastal Plain: Clark (W B), 12; Conrad, 41a, 43a; Emmons (E), 58  
 Miocene: Olsson, 16  
 Mollusca: Tuomey, 52  
 North Dakota, Mollusca: Meek, 56c; Peno Creek: Evans (J), 54b  
 Northwest coast: Dall, 90a  
 Northwest Territory, floras: Dawson (J W), 83a  
 Oklahoma, Plantae: Berry, 18a  
 Oligocene, Assiniboia: Lambe, 06d, e  
 Oregon: Shumard (B F), 58a  
 Astoria: Conrad, 48, 49a  
 Cascade Mountains, plants: Knowlton, 00d  
 Eocene Mollusca: Conrad, 65g  
 horse, Mascall beds: Gidley, 06a  
 John Day Basin: Leidy, 73; Merriam (J C), 01a; plants: Knowlton, 02  
 Miocene fauna: Sternberg, 81g  
 seal: Condon, 06; Wortman, 06  
 Vertebrata: Cope, 79a  
 Miohippus beds: Marsh, 94e  
 northwestern: Washburne, 14  
 Roseburg quadrangle: Dickerson, 14  
 southern, Pliocene: Sternberg, 81a  
 Orthophragmina, Georgia and Florida: Cushman, 17  
 Ostreidae: Heilprin, 84b  
 Panama: Gabb, 81; Joukowsky, 06; Toula, 09a, 11a

## Paleontology—Continued.

## Tertiary—Continued.

- Panama: Gatun fauna: Brown (A P), 11a; Toula, 09  
 Miocene Mollusca: Cossmann, 13  
 Panama Canal Zone, Bryozoa: Canu, 18a; Foraminifera: Cushman, 18a  
 Pecten, Nome gravels: Dall, 07c  
 Pectens, California: Arnold, 06; Heilprin, 81b  
 Pinniped: Condon, 06; Wortman, 06  
 Planorbis, Florissant: Cockerell, 06a  
 Plants: Heer, 61; Lesquereux, 59, 72a, 78, 83; Newberry, 68, 98; Penhallow, 06  
 catalog: Knowlton, 98  
 Florissant, Colo.: Cockerell, 08 j, o  
 international boundary Survey: Penhallow, 07d  
 Plateau province: White (C A), 76  
 Pliocene, Coastal Plain: Dall, 13  
 Florida: Pilsbry, 05  
 Georgia: Aldrich, 11a  
 Vera Cruz, Mexico: Böse, 06i  
 western Nebraska: Matthew (W D), 09e  
 Pliocene faunas, western United States: Merriam (J C), 17a  
 Polyparia, Miocene: Lonsdale, 45a  
 Porto Rico: Reeds, 17a  
 Promerycochoerus, Nebraska: Peterson, 14d  
 Puerco fauna, N. Mex.: Cope, 82d, 83b; Matthew (W D), 97a  
 Potomac group plants, revision: Berry, 10f  
 Proboscidean, Nebraska: Cook (H J), 09a  
 Prorosmarus alleni: Berry, 06e  
 Rhinoceros, Miocene, Nebraska: Barbour, 06, 06f  
 Rhinocerotidae, Miocene: Loomis, 08a; Oligocene and Miocene deposits of North Dakota and Montana: Douglass, 08a  
 Rocky Mountain region: Hitchcock (C H), 71c; Meek, 70c  
 Rodent, Miocene, Kansas: Gidley, 07  
 Rodentia, Paramys and Ischyromyidae: Matthew (W D), 10a; Wasatch and Wind River beds: Loomis, 07  
 Sambucus: Cockerell, 10g  
 Santo Domingo: Gabb, 73; Maury, 17; Moore (J C), 50  
 Mollusca: Sowerby, 50; Oligocene: Pilsbry, 17  
 Scaphopoda: Pilsbry, 98a  
 San Pablo fauna, Cal.: Clark (B L), 15  
 Saskatchewan, Oligocene, Cypress Hills: Lambe, 08; Souris River, Plantae: Dawson (J W), 81  
 Scaphopoda, Jamaica and Costa Rica: Pilsbry, 11  
 Seal, Maryland Miocene: True (F W), 06  
 Sinopa: Matthew (W D), 06  
 Sirenian, Porto Rico: Matthew (W D), 16f  
 Snake Creek fauna: Matthew (W D), 18  
 Sooke fauna, Vancouver Island: Merriam (J C), 99a  
 South Carolina: Conrad, 41a  
 flora: Berry, 14  
 Pisces: Gibbes, 50  
 phosphate beds: Leidy, 77  
 South Dakota, Caimanoidea visheri: Mehl, 16



## Paleontology—Continued.

*Tertiary*—Continued.

- South Dakota: Miocene mammals: Matthew (W D), 06c  
 Trigonias: Lucas (F A), 00a  
 White River region: Hayden, 57a  
 Southern States: Conrad, 34a  
 Stenomylus: Loomis, 10  
 Stenomylus hitchcocki: Peterson, 11a  
 Strepsicerine antelopes, Nevada: Merriam (J C), 09a  
 Suessonian fauna: Cope, 77o  
 Suilline remains, Miocene, Nebraska: Peterson, 06  
 Surgeon-fish, West Indies: Hussakof, 07  
 Swauk series: Duror, 16  
 Tejon fauna: Dickerson, 15; Heilprin, 82d  
 Teleoceras, Nebraska Miocene: Olcott, 09  
 Temnocyon and Hypotemnodon, John Day beds, Oreg.: Eyermann, 96  
 Tennessee, Eocene flower: Berry, 13  
 Terebellum: Harris, 90  
 Texas, Coastal Plain: Deussen, 14  
 Eocene, Omalaxis: Aldrich, 90  
 Eocene Mollusca: Heilprin, 91  
 Galveston well, Neocene Mollusca: Harris, 95a  
 Mollusca: Conrad, 55c; Harris, 95b  
 Titanotheres, Eocene and Oligocene: Osborn, 08b; Uinta beds: Douglass, 10; Riggs, 12  
 Tobago, Miocene: Guppy, 03  
 Trinidad: Etheridge, 60; Guppy, 65; Maury, 12  
 Brachiopoda: Guppy, 66a  
 Eocene: Guppy, 98  
 fossil shells: Guppy, 08  
 Orbitoides: Douvillé, 17  
 Springvale, Miocene fossils: Guppy, 10, 11a  
 Turtles: Hay (O P), 07  
 Bridger basin: Hay (O P), 07c  
 Miocene, Maryland: Palmer (W), 09  
 Uinta Basin: Scott (W B), 99  
 Uinta Mountains: White (C A), 76  
 United States, eastern and southern: Heilprin, 84  
 Utah, Uinta formation, turtles: Gilmore, 16a  
 Vermont, Brandon: Hitchcock (E), 53d, 61; Knowlton, 02b; Perkins (G H), 04d, 05a  
 Green Mountain region: Perkins (G H), 12  
 Vertebrata: Cope, 67c, 69b  
 Miocene: Peterson, 06c  
 Wasatch deposits: Loomis, 07a  
 Vicksburg: Conrad, 47, 49; Mollusca: Casey, 03  
 Virginia, Coastal Plain: Clark (W B), 12b; Conrad, 43a; Lea (H C), 43; Rogers (H D), 37  
 Istiophorus, Miocene: Berry, 17f  
 James River: Tuomey, 42  
 Miocene: Olsson, 16; flora: Berry, 06e, 09  
 Mollusca: Lea (H C), 46  
 Yorktown, invertebrates: Meyer (O), 88  
 Waccamaw fauna: Gardner (J A), 15  
 Wasatch and Wind River faunas: Matthew (W D), 15a, 18a  
 Wasatch Eocene: Cope, 77o  
 Washington: Shumard (B F), 58a  
 Bellingham Bay, plants: Heer, 59  
 Cowlitz River, Oligocene: Dickerson, 17a; Eocene: Weaver, 16b  
 Kitsap Co., Oligocene: Weaver, 16d

## Paleontology—Continued.

*Tertiary*—Continued.

- Washington: Oligocene: Van Winkle, 18  
 Olympic Peninsula: Reagan, 09  
 western: Weaver, 12a, 16, 16a, c  
 Western States, Plantae: Newberry, 83f  
 West Indies: Etheridge, 69; Gabb, 75a; Guppy, 66c, 67, 74, 75  
 Anthozoa: Duncan, 73  
 echinids: Cotteau, 75; Guppy, 66b  
 Mollusca: Guppy, 79, 96; Lorié, 89  
 Whales, ancestors of: Gilbert (J Z), 08  
 White River fauna: Scott (W B), 87  
 Woods, Texas: Penhallow, 07c; Western States: Platen, 08  
 Wyoming: Meek, 73  
 Apternodus, skull: Matthew (G F), 10  
 Bridger beds: Leidy, 73d  
 Eocene, Vertebrata: Cope, 73  
 Green River: Cockerell, 09j; Pisces: Cope, 71a; Eastman, 00a; Jordan, 10  
 Green River shales, Insecta: Scudder, 78, 78a  
 Invertebrata: Meek, 72a  
 Miocene vertebrates: Peterson, 06c  
 Mollusca: Cockerell, 14, 14b  
 Notharctus, Eocene: Granger, 17  
 Oligocene vertebrates: Matthew (W D), 10  
 Plantae: Lesquereux, 72  
 turtles, Oligocene: Lambe, 13b  
 Unio: Cockerell, 15a  
 Vertebrata: Leidy, 72  
 Washakie faunal horizons: Granger, 09  
 Wind River Basin: Granger, 10  
 Yellowstone National Park, Tertiary floras: Knowlton, 96b  
 Yorktown fauna: Gardner (J A), 15  
 Yucatan: Deshayes, 53  
*Triassic.*  
 Alaska: Martin (G C), 16  
 Isocrinus: Bather, 18  
 southeastern: Atwood, 12  
 Alberta, Banff, ganoid fishes: Lambe, 16  
 Araucarioxylon, Connecticut: Knowlton, 01  
 Arctic regions, Eureka Sound: Kittl, 07  
 Arizona, araucarian genus: Jeffrey, 10  
 fossil forests: Knowlton, 13b  
 Little Colorado River, Vertebrata: Lucas (F A), 04  
 Vertebrata: Lucas (F A), 01f  
 Aviculidae, Zacatecas, Mex.: Frech, 07a  
 British Columbia: Whiteaves, 87a, 89a  
 California: Gabb, 64; Smith (J P), 95  
 cestraciont shark: Bryant (H C), 14  
 Ichthyosauria: Merriam (J C), 03  
 Reptilia: Merriam (J C), 95  
 Taylorville region: Hyatt, 92  
 Thalattosauria: Merriam (J C), 04a, 05b  
 Canada, eastern, fossil plants: Holden (R), 13a  
 Cephalopoda: Hyatt, 05  
 Cestraciont teeth: Wemple, 06  
 Cockroaches, Colorado: Scudder, 85g, h  
 Colorado, Fairplay, Insecta: Scudder, 90e  
 Connecticut: Lull, 12b; Newberry, 87c; Rice (W N), 06a  
 fossiliferous black shale: Davis (W M), 91  
 New Haven, reptile: Marsh, 96b  
 Pisces: Eastman, 11; Newberry, 78c



## Paleontology—Continued.

## Triassic—Continued.

- Connecticut Valley: Barbour, 89; Lull, 07b, 15, 17a; Newberry, 88; Pisces: Redfield, 37  
 Coral reefs: Smith (J P), 12a  
 Cordilleran region: Hall, 77; Meek, 77  
 Deep River coal field: Emmons (E), 56  
 Dinosaurs: Huene, 06, 08  
 Distribution, lower Triassic faunas: Smith (J P), 12  
 Echinodermata: Clark (W B), 15  
 Fish, Aspen Ridge, Idaho: Goddard, 07  
 Flora: Ward (L F), 00, 05; Richmond, Va.: Marcou, 90a  
 Footprints: Lull, 04  
 General: Cope, 87c; Emmons (E), 54; Wheatley, 61  
 Hallopus victor: Huene, 08a  
 Honduras, plants: Newberry, 88h  
 Ichthyopterygia, California and Nevada: Merriam (J C), 02  
 Ichthyosauria: Merriam (J C), 08, 08b  
 Ichthyosaurian, Nevada: Merriam (J C), 10  
 Idaho, cestraciont spine: Evans (H M), 04; southeastern: White (C A), 79, 83c  
 Invertebrate faunas, relations: Smith (J P), 15  
 Liriodendron, Deep River beds, North Carolina: Cobb, 04b  
 Marine, western America: Smith (J P), 04a  
 Massachusetts, Hampshire Co.: Emerson, 98  
 pelecypod: Emerson, 00b  
 Stegomus: Emerson, 04b; probable footprints: Lull, 04a  
 Mexico, Zacatecas: Burckhardt, 05  
 Nevada, ichthyosaur: Merriam (J C), 05; Omphalosaurus: Merriam (J C), 11d  
 New Jersey: Newberry, 76c, 87c, 88  
 Hunterdon Co.: Eyermann, 89b  
 Mollusca: Conrad, 69b  
 Newark rocks, dinosaur tracks: Woodworth, 95  
 Pisces: Eastman, 05a  
 Plantae: Fontaine, 90  
 New York, Fort Lee dinosaur: Matthew (W D), 11  
 North America, marine invertebrates: Smith (J P), 14  
 North Carolina, Mammalia: Osborn, 87  
 Microconodon: Osborn, 86  
 wood: Knowlton, 00a  
 Palaeophycus, New Jersey: Lewis (H C), 80m  
 Pennsylvania: Lea, 56; Wherry, 12e  
 Bucks and Montgomery cos.: Lyman, 95  
 Bucks Co., labyrinthodont: Sinclair, 17  
 new cycads and conifers: Brown (A P), 11  
 Newark group: Leidy, 76b  
 Phoenixville: Lea, 57; Leidy, 57a, 59b; Lewis (H C), 84e  
 Myacites: Conrad, 57d  
 Vertebrata: Cope, 66a  
 Plantae: Wherry, 16b  
 Reptilia: Cope, 78j  
 Rutiodon: Sinclair, 18  
 silicified wood: Wherry, 12d  
 York Co., flora: Wanner, 00; tracks, etc.: Wanner, 89  
 Phytosaur, Palisades: Huene, 13

## Paleontology—Continued.

## Triassic—Continued.

- Phytosauria: Mehl, 15  
 Plant-bearing beds: Ward (L F), 92  
 Podokesaurus, Connecticut Valley: Talbot, 11  
 Poposaurus gracilis, Wyoming: Mehl, 15a  
 Prince Edward Island: Bain (F) 85; Dawson (J W), 71; Bathygnathus: Leidy, 54  
 Reptile, marine: Merriam (J C), 06c  
 Reptilia: Cope, 70j; Huene, 14b  
 New Mexico: Huene, 15  
 Wyoming: Williston, 04a  
 Texas, Staked Plains, Unionidae: Simpson (C T), 96  
 Thalattosaurus, California: Merriam (J C), 05e  
 Unios, Massachusetts: Troxell, 14  
 Utah, Park City district: Boutwell, 12  
 Vertebrata: Cope, 88f  
 Virginia: Gabb, 60a  
 James River coal field: Lyell, 47; plants: Bunbury, 47  
 Neocalamites, Richmond coal field: Berry, 12a  
 Western America: Smith (J P), 07  
 Wyoming, Lander, Vertebrata: Williston, 05b  
 Paleopathology.  
 Antiquity of disease: Moodie, 18  
 Dinosaur, pathological lesion: Moodie, 16a  
 Diseased bones, Mesozoic: Moodie, 16c  
 General: Moodie, 16d, 17a, b, 18a, e, f  
 Opisthotonos: Moodie, 18d  
 Paleorhinus: Lees, 07a  
 Paleotrochis: Cobb, 04; Emmons (E), 56a; Marsh, 68; White (C H), 94; Mexico: Williams (H S), 99; origin: Diller, 99a  
 Paleozoic (undifferentiated).  
 Alaska: Emerson, 04  
 Bonnifield region: Capps, 12  
 Chitina Valley: Moffit, 18  
 Circle quadrangle: Prindle, 13b  
 Copper River region: Mendenhall, 05  
 Cosna-Nowitna region: Eakin, 16a  
 Fairbanks quadrangle: Prindle, 13  
 Fort Hamlin to Kotzebue Sound: Mendenhall, 02  
 Gravina Island: Smith (P S) 15  
 Iliamna region: Martin (G C), 12a  
 Kantishna region: Capps, 17  
 Ketchikan district: Wright (C W), 15  
 Lake Clark-central Kuskokwim region: Smith (P S), 17  
 Noatak-Kobuk region: Smith (P S), 13a  
 Nome and Grand Central quadrangles: Moffit, 13  
 northern: Schrader, 04  
 Ruby-Kuskokwim region: Mertie, 16  
 Seward Peninsula: Collier, 02  
 Arctic regions: De Rance, 76; Ellesmere and Grinnell lands: Holtedahl, 17  
 British Columbia: Dawson (G M), 81b  
 Atlin district: Cairnes, 13  
 Boundary district: LeRoy, 13a  
 Cariboo district: Bowman, 88  
 coast region: Bancroft (J A), 13  
 Finlay and Omenica rivers: McConnell, 96  
 California, southeastern: Loew, 76



## Paleozoic—Continued.

- Colorado, Palmer Lake: Cannon, 95a; Perry Park: Cannon, 91a  
 Cordilleran region: King (C), 78a  
 Correlation, America and Europe: Sharpe, 48  
 General: Cooper (W F), 95; Emmons (S F), 93; Hunt, 61a; Owen (D D), 43  
 Greenland, eastern: Toula, 74  
 Guatemala, Alta Vera Paz: Sapper, 01a  
 Lower Paleozoic: Winchell (N H), 88g  
 Maine, Portland and Casco Bay quadrangles: Katz, 13  
 Massachusetts, Crosby, 76  
 Mexico, Coahuila: Haarman, 13; Sonora: Angermann, 04a  
 Mississippi Valley: Nicollet, 43  
 Nevada, Reese River basin: Waring (G A), 18  
 New Brunswick, Burnthill Brook area: Young (G A), 18  
 New Hampshire: Hitchcock (C H), 73b, 84a; White Mountains: Hitchcock (C H), 77d  
 New Jersey: Merrill (F J H), 87  
 Ontario: Bayfield, 45; Moose River basin: Bell (J M), 04  
 Oregon, Blue Mountains: Lindgren, 01; southwestern: Diller, 14a; Winchell (A N), 14a  
 Quebec: Bayfield, 45  
 Utah, high plateaus: Dutton, 80  
 Washington, northeastern: Bancroft (H), 14  
 Wyoming, Lincoln Co.: Schultz, 14  
 Yukon, Klondike gold fields: McConnell, 00  
 Paleozoic platform of North America: Ruedemann, 10  
 Paleozoic rocks, Mississippi basin, thickness: Keyes, 96e  
 Paleozoic section in New York: Cushing, 08  
 Paleozoic systems, revision: Ulrich, 11a  
 Palisade diabase: Sosman, 13; contact phenomena: Irving, 99a  
 Palladium, occurrence: Kunz, 18  
 Palmer Lake region, Colo.: Cannon, 95a  
 Pamunkey formation: Clark (W B), 96  
 Panama (including Canal Zone).  
 Canal Zone: Fernández, 15; Howe, 07, 07a, 08  
 Culebra cut: MacDonald (D F), 12e  
 General: Deck, 55; Douvillé, 91, 98a; Garella, 49; Hill (R T), 96b; Hopkins (E), 48; Lloyd, 49; Maack, 72; MacDonald (D F), 13c; Anon, 90  
 Geologic history of Isthmus: Hill (R T), 98c  
 Geological notes: Hershey, 08  
*Economic geology.*  
 Coal deposits: MacDonald (D F), 12b; Chiriqui district: Evans (J), 61; Jackson, 61b  
 Gold: Hershey, 99b; Palenque region: Taylor (R C), 52  
 Manganese: Williams (E G), 03  
*Historical geology.*  
 Chiriqui district: Evans (J), 61; Eocene: Jackson, 61b  
 General: Bertrand, 99, 00, 06; Edwards (H W), 02; Hayes, 10a, 11c; Hill (R T), 98c; MacDonald (D F), 12d, 13c, f, 15, 16a; Sapper, 05a  
 Geologic history of Isthmus: Hill (R T), 98c  
 Horizons containing Orbitoides, age: Douvillé, 15b

## Panama—Continued.

*Historical geology—Continued.*

- Isthmus, central part: Hershey, 01d  
 Los Santos: MacDonald (D F), 13e  
 Oligocene: Dall, 16b  
 Palenque region: Taylor (R C), 52  
 Tertiary deposits: Joukowsky, 06; Vaughan, 18c; correlation: Vaughan, 18d

*Paleontology.*

- Algae, Canal Zone: Howe (M A), 15  
 Bryozoa, Emperador limestone: Canu, 18a  
 Calappa, Miocene crab: Bouvier, 99  
 Cirripedia: Pilsbry, 18  
 Decapod Crustacea: Rathbun, 18  
 Echini: Jackson (R T), 17, 18  
 Foraminifera: Cushman, 18a, b  
 Gatun fauna: Brown (A P), 11a  
 Lithothamnidae: Howe, 18  
 Miocene Invertebrata: Gabb, 81  
 Mollusca, Miocene: Cossmann, 13; Tertiary: Conrad, 56; Dall, 12a; Joukowsky, 06  
 Plants: Berry, 14h, 18  
 Pleistocene: Brown (A P), 13; Foraminifera: Cushman, 04a  
 Tertiary fauna, Gatun: Toula, 09, 09a, 11a

*Physical geology.*

- Chiriqui Volcano: MacDonald (D F), 13b  
 Culebra cut, heated areas: MacDonald (D F), 12, 12a; Williams (H S), 12a  
 Earthquake, Almirante, April, 1916: Reid (H F), 17; Los Santos: MacDonald (D F), 13e  
 Earthquake phenomena: MacDonald (D F), 15a  
 General: MacDonald (D F), 16a  
 Gravitation waves in Culebra cut: Cornish, 13  
 Landslides, Panama Canal: Branner, 16b; Cornish, 13a; Goethals, 16; MacDonald (D F), 12d, 13e, 16; Miller (B L), 17a; Van Hise, 16; mechanics: Becker, 16  
 Pleistocene submergence: Upham, 90d

*Physiographic geology.*

- Ancient canals: Dickerson, 17c  
 Canal Zone: MacDonald (D F), 15  
 Isthmus, central part: Hershey, 01d  
 Los Santos: MacDonald (D F), 13e  
 Panamint Valley, Cal.: Gale, 14g  
 Panhandle, Tex.: Gould, 06, 07  
 Panhandle cos., W. Va.: Grimsley, 07  
 Panther Creek valley, Pa.: Richards (W B), 13  
 Pantodonta: Osborn, 98e  
 Pantylus, colylosaurian: Broom, 13b  
 Paradox Lake quadrangle, N. Y.: Ogilvie, 05  
 Paradoxides, ontogeny: Raymond (P E), 14  
 Paraffin dirt, Gulf Coast oil fields: Brokaw, 18  
 Paragenesis of minerals  
 Allanite and epidote: Hobbs, 89  
 British Columbia, Hedley district: Camsell, 10a  
 Slovan district: Uglow, 17  
 Telkwa district: Dolmage, 18  
 California, magnetite ores of Shasta Co.: Prescott, 08c  
 San Diego Co., Rincon pegmatite veins: Rogers (A F), 10b  
 Colorado, Leadville: Loughlin, 18  
 Montezuma: Van Horn (F R), 08a  
 Connecticut, Litchfield sulphide-bearing rocks: Howe (E), 15  
 Copper, Bonanza mines: Tolman, 16a



## Paragenesis of minerals—Continued.

- Copper ores, Lake Superior: Pumpelly, 71  
 Latouche Island, Alaska: Lincoln, 09  
 Crystallographic intergrowths: Ray, 16  
 Diabase, Massachusetts: Emerson, 16a  
 General: Rogers (A F), 10d, 12e  
 Gold-bearing ores: Pearce, 90a  
 Harney Peak region: Ziegler, 14a  
 Montana, Butte district: Bard, 13; Ray, 14;  
 Simpson (J F), 08; Thompson (A P), 15;  
 Weed, 12  
 Mexico, Velardeña district: Spurr, 08a  
 New Jersey, Princeton minerals: Hawkins, 13  
 Nevada, Yerington district: Knopf, 18a  
 North Carolina, Virgilina district: Laney, 17  
 Replacement of sulphides by quartz: Wolcott,  
 17  
 Sulphide intergrowths: Whitehead, 16  
 Virginia, Virgilina district: Laney, 17  
 Watchung basalt: Fenner, 10b  
 Zinc minerals, Tintic district, Utah: Loughlin,  
 14a
- Paramorphism: Cross, 88b  
 Paramylodon dermal bones from Rancho La Brea,  
 Cal.: Sinclair, 10  
 Parasites of oyster: White (C A), 84d  
 Parasitism of Carboniferous crinoids: Moodie, 18c  
 Pariotichus, skull: Branson, 11  
 Park City district, Utah: Boutwell, 07, 12  
 Parker channel: Williams (E H), 01  
 Parker folio, S. Dak. (no. 97): Todd, 03a  
 Pasceolus: Billings, 65a; Hyatt, 65a; Niles, 65;  
 Roemer, 88  
 Passaic folio, N. J.—N. Y. (no. 157): Darton, 08b  
 Patagonia district, Ariz: Probert, 14  
 Patellipora: Rominger, 87  
 Pathology and bacteriology, Mesozoic: Moodie, 16c  
 Patoka folio, Ind.—Ill. (no. 105): Fuller, 04  
 Patricia district, Ont.: Miller (W G), 12  
 Patriofelis: Osborn, 00b; Wortman, 94  
 Patton quadrangle, Pa.: Campbell (M R), 13a  
 Patuxent folio, Md.—D. C. (no. 152): Shattuck, 07c  
 Paving brick material: Rolfe, 08a  
 Pawnee Buttes, Colo.: Henderson, 07  
 Pawpaw-Hancock folio, Pa.—W. Va.—Md. (no. 179):  
 Stose, 12b  
 Peace River canyon, B. C.: Galloway, 13
- Peat.  
 Anticosti Island: Twenhofel, 10  
 Canada: Anrep, 15; Chalmers, 04  
 Chemical products from peat: Davis (C A), 10  
 Dismal Swamp: Wieland, 97  
 Florida: Forsaith, 16  
 Formation: Bartlett, 11; in Dismal Swamp:  
 Lesquereux, 52a  
 General: Davis (C A), 09b, 11; Hunt, 57b, 64d;  
 Nystrom, 08; Osbon, 18; Shaler, 95b;  
 Stevenson, 16  
 Maine, Livermore quadrangle: Burr (F F), 17  
 Minnesota: Soper, 17a  
 Nebraska: Barbour, 16  
 New Brunswick: Ganong, 97  
 Origin: Davis (C A), 09d; Newberry, 82; and  
 formation: Davis (C A), 13  
 United States: Davis (C A), 09a; Turp, 16  
 Wisconsin: Huels, 15

Peat deposits as geological records: Davis (C A), 08.  
 Pebbles.

- Carboniferous: Poole, 89; Alabama: Prouty,  
 12a  
 Clay pebbles in stratified gravel and sand:  
 Winchell (N H), 94f  
 Coal beds, Beaver Co., Pa.: Lesley, 84  
 Deformed pebbles: Rogers (W B), 75; in  
 ancient conglomerates: Clarke (J M), 15e  
 Distorted pebbles: Hitchcock (C H), 68f  
 Boston Basin: Crosby, 80a  
 cause: Rogers (W B), 61a  
 in conglomerate: Crosby, 80b  
 origin: Jackson, 60  
 Rangely Lake, Maine: Vose, 68b  
 Vermont: Hitchcock (E), 60; in conglomer-  
 ate: Hitchcock (C H), 60c  
 Fossiliferous pebbles: Woodworth, 92  
 Geyserite pebbles, Yellowstone National Park:  
 Comstock, 76  
 Harwich, Cape Cod: Julien, 07c  
 Intraformational, Richmond group: Foerste, 17  
 Kentucky, Licking Valley: Squier, 83  
 Metamorphism: Niles, 72a  
 Minnesota, Princeton: Winchell (N H), 83a  
 Plasticity: Blake (W P), 70  
 Polished: George (R D), 07  
 Shape: Gregory (H E), 15  
 Stretched: McCallie, 06  
 Virginia, cobblestone deposits: Rogers (W B),  
 75a
- Pecatonica limestone: Hershey, 97a  
 Peel River, Yukon and Mackenzie: Camsell, 06, 06b  
 Pegmatite in granite of Massachusetts: Warren, 09  
 Pegmatites, origin: Crosby, 94c, 97b; Hastings, 08a;  
 Bedford area, N. Y.: Luquer, 96
- Pelecypoda. *See also* Mollusca.  
 Alaska, *Mytilus middendorffii*: Gratacap, 12a  
 Ambonychia, etc.: Hall, 59a, i  
 Amnigenia, occurrence: Clarke (J M), 01b  
 Anomalodonta, synonym for Megaptera: White  
 (C A), 74a  
 Anomia, Cretaceous, South Carolina: Mazyck,  
 78  
 Anoplophora, Triassic: Emerson, 00b  
 Arca punctifer: Ami, 96c  
 Arcas, Atlantic slope: Sheldon, 17; Neocene,  
 California: Osmont, 05a  
 Asthenodonta, South Joggins, N. S.: Whiteaves,  
 94a  
 Auburn chert fauna, Missouri: Branson, 09  
 Aucella: White (C A), 88  
 Aviculidae: Jackson (R T), 90; Triassic, Zacate-  
 cas, Mex.: Frech, 07a  
 Aviculipecten: Girty, 04c; Meek, 68c; type:  
 Hind, 04  
 Barrettia: Whitfield, 97d; Jamaica: Woodward  
 (S P), 62  
 California, Coalinga district, Cretaceous and  
 Tertiary: Arnold, 09a  
 Contra Costa Co.: Rémond, 63  
 southern, Tertiary: Arnold, 07b  
 Carboniferous: Girty, 04b; McChesney, 59  
 Cardinia angulifera: Ami, 96c  
 Cardium, Pleistocene, Hudson's Bay: Stimp-  
 son, 62



## Pelecypoda—Continued.

- Chazy: Raymond (P E), 16b; Canada: Whiteaves, 08  
 Chondrodonta, Cretaceous: Stanton, 01  
 Cincinnati: Miller (S A), 74c, e, 81a; Whitfield, 78a  
 Classification: Hall, 84b  
 Cleidophorus, Niagaran, Illinois: Miller (S A), 81a  
 Conocardium: Dekay, 23; Devonian, Iowa Keyes, 92j  
 Corbiculadae: Prime, 65  
 Crassatellidae: Conrad, 69a  
 Criocardium: White (C A), 80b  
 Cypricardites: Hall, 62d  
 Cyrena, Alberta: Whiteaves, 03a  
 Cyrtodonta, Migouasha, Gaspé: Clarke (J M) 11a  
 Cytherea convexa: Dall, 92c  
 Descriptions: Hall, 84b  
 Devonian: Clarke (J M), 07a; Hall, 84e, j; Ohio: Hall, 73a  
 Didymotis trinidadensis, Lower Cretaceous Trinidad: Sommermeier, 18  
 Donax: Dall, 92b  
 Eocene, Alabama: Aldrich, 07a  
 Ethmocardium: White (C A), 80b  
 Euchondria: Meek, 74b  
 Eurymya: Sardeson, 02  
 Exogyra: Stephenson, 14  
 Fossilization, deceptive: Sardeson, 02  
 Gnathodon: Dall, 95  
 Grammatodon: Woods, 99  
 Gryphaea, Cretaceous, Texas: Hill (R T), 98  
 Hinge teeth, morphology: Dall, 01  
 Illinois, Chicago area, Pleistocene: Baker, 98; Coal Measures: Worthen, 82a  
 Indiana, Salem limestone: Beede, 06  
 Jamaica, Bowden fauna: Woodring, 17  
 Kansas, Coal Measures: Beede, 99c; Worthen, 82a; Cretaceous: White (C A), 80c  
 Leptonacea: Dall, 99  
 Lignitic stage: Harris, 97  
 Linearia, Cherokee Co., Tex.: Johnson (C W), 04  
 Lucina, Jamaica: Dall, 01c  
 Lyropecten, California: Dall, 01b  
 Macridae, Pacific coast: Packard (E L), 15  
 Mactrinae Mesozoic and Cenozoic, Pacific coast: Packard (E L), 16a  
 Maine, Silurian: Williams (H S), 13a  
 Maryland, Devonian: Clarke (J M), 13e; Ohern, 13b; Prosser, 13c  
 Matheria brevis, Trenton, Ottawa: Whiteaves, 03c  
 Mexico, Cerro de Muleros: Böse, 10  
 Modiolopsis oblonga: James (J F), 90b  
 Monopteria, Kansas: Beede, 98e  
 Montana, Cretaceous: Meek, 56b  
 Moorefield shale fauna: Girty, 11  
 Myalina, Carboniferous, Texas: Whitfield, 02  
 Naiadites, Carboniferous, Nova Scotia: Dawson (J W), 94d  
 New Jersey, Cretaceous and Tertiary: Whitfield, 85  
 New Mexico, Pinna: White (C A), 81c  
 New York, Devonian: Hall, 71b, 84, 84c, 85; Portage: Whitfield, 05

## Pelecypoda—Continued.

- Nova Scotia, Carboniferous: Dawson (J W), 94e  
 Nuculites, Silurian, Maine: Williams (H S), 17  
 Ontario, Ottawa, Ordovician: Wilson (A E), 15  
 Opisthoptera: White (C A), 75  
 Ordovician: Ulrich, 90d  
 Minnesota: Ulrich, 92, 97  
 Ohio: Ulrich, 93  
 Oryctomya, Claiborne, Ala.: Dall, 98c  
 Ostrea, Eocene, Alabama: Aldrich, 04  
 Ostreidae: Hellprin, 84 b; White (C A), 84  
 Paleozoic: Hall, 84b  
 Pandora, California: Rivers, 02  
 Panenka, Ontario, Devonian: Whiteaves, 91d, 02, 02a  
 Park City formation phosphate beds fauna: Girty, 10  
 Pecten, Nome gravels: Dall, 07c  
 Pecten dalli, Potomac Creek, Va.: Clark (W B), 98b  
 Pectens, revision: Hellprin, 81b; Tertiary and Pleistocene, California: Arnold, 06  
 Pectinidae, Cretaceous, Texas: Kniker, 18  
 Pectinoid shells, characters: Hall, 85d  
 Pennsylvania: Conrad, 60  
 Phylogeny: Jackson (R T), 90  
 Pinnidae: Hyatt, 92a  
 Plagiostoma, California: Trask, 56c  
 Pseudomonotis, Coal Measures, Kansas: Beede, 99a  
 Pteriidae: Meek, 64b  
 Pterinea, revision: Williams (H S), 08a  
 Quebec, Magdalen Islands: Beede, 11  
 Remondia: Stanton, 97b  
 Rudistae, Cretaceous, Jamaica: Whitfield, 97b  
 Shell structure: White (C A), 68e  
 Silurian, Tennessee, Indiana, and Kentucky: Foerste, 09b  
 Sutton Jurassic of Vancouver Island, B. C.: Clapp (C H), 11a  
 South Dakota, Cretaceous: Meek, 56b  
 Spirodomus: Beecher, 86  
 Tejon fauna: Dickerson, 15  
 Tellinomya: Hall, 56b  
 Terminology: Hyatt, 95a  
 Tertiary: Conrad, 67f  
 Texas, Carboniferous: Gabb, 59a  
 Cretaceous: Schlüter, 87a; White (C A), 80c, 87c  
 Triassic Unionidae: Simpson (C T), 96  
 Triassic, marine: Smith (J P), 14; Mexico, Zacatecas: Burckhardt, 05  
 Torsion of shell: Clarke (J M), 03e  
 Unio, Cretaceous, Vancouver Island: Whiteaves, 01  
 Laramie group: Whitfield, 03  
 Tertiary, Wyoming: Cockerell, 15a  
 Wisconsin: Wagner, 05  
 Unione fauna of Great Lakes: Walker (B), 13  
 Unionidae, Cretaceous, New Jersey: Lea, 68  
 Laramie clays, Montana: Whitfield, 07a  
 origin: White (C A), 05  
 Triassic, Massachusetts: Troxell, 14  
 Utah, Thaynes limestone fossils: Girty, 10b  
 Venus shells, New York City: Wilson (J H), 06a  
 Xylophomya, Wyoming, Laramie group: Whitfield, 02b  
 Peléoliths: Winchell (N H), 04b



**Pele's hair:** Dana (J D), 79b  
**Pele's tears:** Moore (E S), 16  
**Pelitic sediments and magmatic differentiation:**  
     Hobbs, 13b  
**Pelmatozoa, Chazy:** Hudson, 07  
**Pelona series:** Hershey, 12b  
**Peltoceras:** Whiteaves, 07a  
**Pelycosauria:** Baur, 99; Broom, 14b; Case, 02a, 03b;  
     columella auris: Cope, 85b; revision:  
     Case (E C), 07a  
**Peneplains.**  
     **Age in Rocky Mountains:** Atwood, 17a; Black-  
         welder, 17  
     **Appalachian:** Grimsley, 16  
         age, Shaw (E W), 18a  
         southern: Hayes, 94f; Keith, 96c  
     **Arcadia:** Daly (R A), 01  
     **Atlanticslope:** Davis (W M), 91a  
     **Chattanooga district:** Hayes, 99e  
     **Connecticut:** Davis (W M), 98  
     **Criteria for peneplains:** Trowbridge, 13  
     **Driftless Area:** Hughes (U B), 16; Trowbridge,  
         15  
     **General:** Daly (R A), 99b; Davis (W M), 99;  
         Tarr, 98  
     **Harrisburg peneplain:** Campbell (M R), 03a  
     **Idaho, northern:** Rich, 18b  
     **Idaho peneplain, age:** Lindgren, 18a; Living-  
         ston, 18  
     **Illinois:** Hershey, 97b; northwestern: Hershey,  
         96b  
     **Iowa:** Hershey, 97b  
     **Kansas:** Beede, 17  
     **Lake Superior highlands:** Keyes, 15d  
     **Laurentian:** Wilson (A W G), 03a  
     **Massachusetts, western:** Dixon, 97  
     **Minnesota:** Hershey, 97b  
     **Mississippi Valley:** Malott, 16  
     **New England peneplain in White Mountain**  
         **region:** Lobeck, 16, 17  
     **Ozark region:** Hershey, 01  
     **Tennessee, eastern:** Dodge (R E), 96  
     **Washington, Cascade:** Smith (W D), 17  
     **West Virginia, Jefferson, Berkeley and Morgan**  
         **cos.:** Grimsley, 16  
     **Wisconsin, north central:** Weidman, 03a  
     **Wyoming, Bishop conglomerate:** Rich, 10;  
         western: Blackwelder, 15  
**Peneplanation:** Chamberlin (T C), 13b; Smith  
     (W S T), 99  
**Penfield, S. L., biography:** Iddings, 08; Miers, 07;  
     Pirsson, 06; Wells, 06, 07  
**Penhallow, D. P., biography:** Barlow, 11; Jeffrey,  
     11a  
**Pennsylvanian-Permian stratigraphic break:** Lee  
     (W T), 17b  
**Pennsylvania.**  
     **Allegheny Co.:** Jillson, 66  
     **Anthracite region:** Wistar (I J), 96  
     **Bedford Co., Hayden,** 30  
     **Berks Co., Oley Valley:** Bertelet, 56  
     **Bone caves:** Baird, 50  
     **Boulders in gneiss matrix:** Leeds, 70  
     **Carbon Co.:** Ashburner, 84a  
     **Cave containing vertebrate remains:** Wheatley,  
         71  
     **Coal measures water courses:** Blandy, 76

# **Pennsylvania—Continued.**

**Delaware Co:** Smith (G), 62  
**Dopplerite-like substance, Scranton:** Lewis (H  
     C), 82b  
**Footprints and other impressions:** Rogers  
     (H D), 55a  
**General:** Leeds, 71a; Lesley, 81b; Rath, 88;  
     Rogers (H D), 53a; Stone (R W), 08d  
**Geologic history:** Claypole, 90a  
**Geologic work, progress of:** Ashley, 08a; Stone  
     (R W), 08a  
**Geological Survey:** Rogers (R E), 59; Anon, 59  
**Lacoe collection, catalog:** Welter, 00  
**Lawrence Co.:** Leasure, 56  
**Lycoming Co.:** Anon, 66  
**McDonald deep well:** White (I C), 13a  
**Materials of the Appalachians:** Claypole, 85d  
**Mercersburg-Chambersburg district:** Stose, 09  
**Pebbles in coal beds, Beaver Co.:** Lesley, 84  
**Philadelphia, "field of rocks:"** Martin (D S),  
     87; Troost's survey: Hamilton, 01  
**Philadelphia district:** Bascom, 09a; Heilprin,  
     85  
**Philadelphia gravels:** Leidy, 82  
**Pittsburgh region:** Grabau, 02d; Grant (U S),  
     03a; White (I C), 02c  
**Port Kennedy bone cave:** Cope, 95l  
**Scranton district:** Griffith, 12  
**Second geological survey, progress:** Ashburner,  
     81a; publications: Ashburner, 85e  
**Snyder Co.:** Anon, 84f  
**Survey, proposal for:** Say, 33  
     progress: Lesley, 83c  
     reports: Lesley, 75, 86-89; Pa G S, 76; Pa Top  
         G S Com, 02, 06, 08, 11, 12, 14; Rogers (H  
         D), 36a, 38-42; summary 1874-1887: Les-  
         ley, 87  
     index: Ingham, 95  
**Surveys, history:** Lesley, 76  
**Trenton quadrangle:** Bascom, 09b  
**Wayne Co.:** Davis (J P), 32  
**West Elizabeth deep well:** Watson, 11c  
**Western Pa.:** Campbell (M R), 02c  
**York Co.:** Demming, 13  
**Economic geology.**  
**Adams Co.:** Frazer, 76, 77  
**Allegheny Co.:** Stevenson, 76, 77  
**Amity quadrangle:** Clapp (F G), 07a, c  
**Analyses:** McCreath, 75, 79, 81  
**Anthracite:** Althouse, 07a; Ashburner, 83b, d,  
     84, 84b, d, 86; Bowen (E), 48, 52; Chance,  
     83; Green (W jr), 64; Griffith, 06; Hill (F  
     A), 87; Joyce, 07; Lea, 43a; Meade (W), 27;  
     Pa, Gen As, 34; Pierce, 27; Platte (F), 81;  
     Rogers (H D), 38, 58; Silliman, 26, 30a;  
     Smith (A D), 95; Stoek, 02; Storrs, 05  
**Beaver Creek district:** Johnson (W R), 39b  
**classification:** Ashburner, 86i  
**Luzerne Co.:** Johnson (W R), 39a  
**Mauch Chunk:** Silliman, 30b  
**New Boston Basin:** Lyman, 89  
**northern field:** Gleason, 14; Hill (F A), 87c;  
     Wasmuth, 92  
**occurrence and origin:** Gresley, 96  
**origin:** Stevenson, 93, 95a  
**Panther Creek basin:** Ashburner, 83; Rich-  
     ards (W B), 13



## Pennsylvania—Continued.

*Economic geology*—Continued.

- Anthracite: Parkiomen Creek, Montgomery Co.: Carter (O C S), 94  
 Schuylkill Co., Tamaqua: Koehler, 35  
 southern field: Haertter, 08; Lea (M C), 41; Wasmuth, 88b  
 Sullivan Co.: Claghorn, 89  
 Wayne Co.: Meredith, 27  
 Wilkesbarre: Cist, 21a  
 Anthracite beds, original southern limit: Lyman, 03  
 Anthracite fields, folding and faulting: Lyman, 96  
 Mahanoy and Shenandoah basins, map: Ashburner, 81b  
 map: Alder & Company, 16; Ashburner, 85; Pa G S, 2d, 90  
 stratification: Wasmuth, 87  
 Anthracite region, atlas: Ashburner, 83a  
 Appalachian region: Rogers (H D), 38  
 Armstrong Co.: Platt (W G), 80  
 Barite: Watson (T L), 15; southern Pa.: Stose, 04  
 Barnesboro quadrangle: Campbell (M R), 13a  
 Beaver quadrangle: Woolsey, 05, 06a  
 Bedford Co.: Stevenson, 85  
 Berks Co.: D'Inwilliers, 83  
 Blair Co.: Platt (F), 81a  
 Brownstones: Hopkins, 97, 97b  
 Brownsville quadrangle: Campbell (M R), 03  
 Building stone: Hawes, 84  
 Beaver quadrangle: Woolsey, 06a  
 Johnstown area: Phalen, 11a  
 Philadelphia district: Bascom, 09a  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Butler Co.: Chance, 79  
 Cambria Co.: Platt (F), 77  
 Cameron Co.: Shaefer, 85  
 Carnotite, near Mauch Chunk: Wherry, 14, 14d  
 Cement materials: Eckel, 13; Halberstadt, 10  
 Lehigh and Northampton cos.: Peck, 04b, 08  
 Lehigh Co.: Prime, 78  
 Lehigh district: Eckel, 04c; Peck, 11  
 Centre Co.: D'Inwilliers, 84  
 Chester Co.: Frazer, 83; Lesley, 83; Rogers (H D), 53  
 Clarion Co.: Chance, 80b  
 Clay: Beaver quadrangle: Woolsey, 06a  
 Cambria Co.: Phalen, 07a  
 Clarion quadrangle: Lines, 07  
 Great Valley and South Mountain: Hopkins (T C), 00a  
 Johnstown area: Phalen, 10, 11a  
 Kittanning and Rural Valley quadrangles: Butts, 06a  
 Ohio and Beaver rivers region: Hice, 05  
 Ohio Valley: Woolsey, 04  
 plastic, Conshohocken: Hopkins (T C), 00b  
 southeastern Pa.: Hopkins (T C), 00  
 South Mountain: Stose, 07  
 southwestern Pa.: Ashley, 08c  
 Warren quadrangle: Butts, 10  
 western Pa.: Hopkins (T C), 98  
 white, southeastern Pa.: Hopkins (T C), 00d  
 Clays and shales, central Pa.: Ashley, 06b

## Pennsylvania—Continued.

*Economic geology*—Continued.

- Claysville quadrangle: Munn, 12  
 Clearfield Co.: Chance, 84; Johnson (W R), 39  
 Clinton Co.: Chance, 80  
 Coal: Bowen (E), 62; Burrows (J S), 14; Campbell (M R), 03c; Chance, 82; Daddow, 66; Griffith, 06; Heurteau, 03; Hildreth, 35; Logan, 42; Maxwell, 58; Pa, Gen As, 34; Pierce, 27; Platt (F), 75; Ramsay, 96; Rogers (H D), 39, 40, 43b, 51a, 58; Seddon, 07; Sheaffer, 80; Simmersbach, 03; Taylor (R C), 35  
 Accident and Grantsville quadrangles: Martin (G C), 08a  
 Allegheny Co.: Stevenson, 76, 77  
 Amity quadrangle: Clapp (F G), 07a, c  
 Armstrong Co.: Platt (W G), 80  
 Barnesboro and Patton quadrangles: Campbell (M R), 13a  
 Barnesboro-Patton field: Burrows (J S), 04  
 Bear Valley district, Dauphin Co.: Johnson (W R), 41b  
 Beaver Co.: White (I C), 74, 76  
 Beaver quadrangle: Woolsey, 05, 06a  
 Beaver River district: White (I C), 78  
 bituminous field: White (D), 02  
 Blair Co.: Platt (F), 81a; Tipton Run: Ashburner, 86a  
 Blossburg region: Hardt, 98  
 Bradford Co., Barclay basin: Platt (F), 78  
 Broadtop field: Gardner (J H), 13a; Lesley, 57; map: Gardner (J H), 14  
 Brownsville quadrangle: Campbell (M R), 03  
 Buck Mountain: Althouse, 07  
 Bucktown field, Somerset Co.: Althouse, 00  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Burgettstown quadrangle: Griswold, 05  
 Butler Co.: Chance, 79  
 Cambria field: Butts, 04a; Platt (F), 77  
 Cameron Co.: Sheaffer, 85  
 Cannelton, Beaver Co.: Mansfield, 05  
 Carbon Co.: Ashburner, 84a  
 Carbon Creek field: Johnson (W R), 40  
 central Pa.: Fluck, 04  
 Centre Co.: D'Inwilliers, 84; Platt (F), 75  
 Clarion Co.: Chance, 80b  
 Clarion quadrangle: Lines, 07a  
 Claysville quadrangle: Munn, 12  
 Clearfield Co.: Chance, 84; Kemp, 93f; Platt (F), 75  
 Clearfield field: Ashley, 06a  
 Clinton Co.: Chance, 80; Leeds, 54b  
 Connellsville quadrangle: Campbell (M R), 03  
 Dauphin Co.: Johnson (W R), 41a; Lea (I), 51a  
 Ebensburg quadrangle: Butts, 05b  
 Elders Ridge field: Stone (R W), 04, 05a, b  
 Elk Co.: Ashburner, 85a; Jackson, 56c, f; St. Marys: Ashburner, 81  
 Fayette Co.: Stevenson, 77, 78a  
 Forest Co.: Ashburner, 85a  
 Greene Co.: Stevenson, 76; White (I C), 74a  
 Hazleton district: Parsons (F W), 06  
 Huntingdon Co.: Lesley, 76b  
 Indiana Co.: Hall (R D N), 11; Platt (W G), 78



**Pennsylvania—Continued.***Economic geology—Continued.*

Coal: Indiana quadrangle: Richardson (G B), 04a  
 Jefferson Co.: Platt (W G), 81  
 Johnstown area: Phalen, 07, 10, 11a  
 Kittanning and Rural Valley quadrangles:  
 Butts, 06a  
 Lackawanna Basin: Rogers (H D), 54  
 Latrobe quadrangle: Campbell (M R), 04  
 Lawrence Co.: White (I C), 79  
 Lycoming Co.: Sherwood, 80  
 Lycoming Valley: Hodge (J T), 53a  
 McKean Co.: Ashburner, 80; Jones (N F), 81;  
 Needham, 57; Owen (D D), 57c  
 Masontown and Uniontown quadrangles,  
 Campbell (M R), 02a  
 Mercer Co.: White (I C), 80  
 Monongahela River region: Wall, 84  
 northern Pa.: Taylor (R C), 35e  
 Panther Creek Valley: Richards (W B), 13  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Pittsburgh bed: Burroughs, 14c; White (I C),  
 98a  
 Pittsburgh region: D'Invilliers, 86, 87; Lesley,  
 86e  
 Pocono coals: Halberstadt, 14  
 Potter Co.: Platt (F), 78, 80  
 Punxsutawney and Glen Campbell fields,  
 Indiana and Jefferson cos.: Peck, 06  
 Queen's Run basin, Clinton Co.: Platt (F), 80a  
 Quemahoning field, Somerset Co.: Kimball,  
 84  
 Renovo Basin, Clinton Co.: Ashburner, 80b  
 Rogersville quadrangle: Clapp (F G), 07b  
 Rural Valley quadrangle: Butts, 05a  
 Schuylkill field: Sheaffer, 58; Taylor (R C), 41  
 Sewickley quadrangle: Munn, 11  
 Coal, Somerset Co.:  
 Fulton (J) 74; Johnson (W R), 41; Lesley,  
 71a; Platt (F), 77a  
 Wellersburg basin: Lesley, 86a  
 southwestern Pa.: Ashley, 08c  
 Sullivan Co.: Platt (F), 79; Sherwood, 80;  
 Bernice Basin: Ashburner, 86d  
 Tangascootac Basin, Centre and Clinton cos.:  
 Platt (F), 80b  
 Tioga Co., Blossburg Basin: Platt (F), 78;  
 Taylor (R C), 35b  
 Tioga River: Meade (W), 28  
 Tipton, Blair Co., age: White (D), 01a  
 Warren Co.: Carll, 83  
 Warren quadrangle: Butts, 10  
 Washington and Greene cos.: Boileau, 07  
 Washington Co.: Clapp (F G), 07c; Stevenson,  
 76  
 Waynesburg quadrangle: Stone (R W), 05  
 western Pa.: Pomeroy, 32; Seddon, 07; Steven-  
 son, 75a  
 Westmoreland Co.: Stevenson, 77, 78a  
 Youghiogheny Valley: Platt (F), 76  
 Coal, oil, and anthracite districts: Cadell, 91  
 Coal fields, bituminous, map of: Halberstadt, 07  
 Coal measures, lower productive: Adams (T K),  
 03  
 Coatesville quadrangle: Bliss (E F), 14  
 Connellsville quadrangle: Campbell (M R), 03  
 Copper deposits: Frazer, 77a; Weed, 11

**Pennsylvania—Continued.***Economic geology—Continued.*

Copper deposits: Adams Co.: Bailey (J T), 83;  
 Frazer, 83h  
 Berks Co.: Hunt, 76a  
 Franklin and Adams cos.: Wherry, 11  
 Gettysburg region: Frazer, 77f  
 Monterey: Frazer, 79a  
 Newark: Wherry, 08a  
 South Mountain region: Bevier, 14; Blandy,  
 79; Frazer, 84a; Henderson (C H), 84;  
 Stose, 10  
 traces in Bucks and Montgomery cos.: Lyman,  
 98a  
 York Co.: Jandorf, 13  
 Corundum: Willcox, 83; Chester Co.: Leidy,  
 72l  
 Cumberland Co.: Frazer, 77  
 Delaware Co.: Hall (C E), 85  
 Ebensburg quadrangle: Butts, 05b  
 Economic minerals: Brown (A P), 13  
 Elders Ridge quadrangle: Stone (R W), 05a, b  
 Elk Co.: Ashburner, 85a  
 Elkland quadrangle: Fuller, 03a  
 Emery ore, Delaware Co.: Genth, 80a  
 Fayette Co.: Stevenson, 77, 78a  
 Feldspar deposits: Bastin, 10; Watts (A S), 16  
 Montgomery Co.: Carter (O C S), 91a  
 southeastern Pa.: Hopkins (T C), 99; in  
 serpentine: Hopkins (T C), 98c  
 Fire clay: Morganroth, 16  
 Cannelton, Beaver Co.: Mansfield, 05  
 Somerset Co.: Harden, 86  
 Forest Co.: Ashburner, 85a  
 Foxburg and Clarion quadrangles: Shaw (E W),  
 11d, e  
 Foxburg quadrangle: Shaw (E W), 11b  
 Franklin Co.: Frazer, 77  
 Fulton Co.: Stevenson, 85  
 Gaines quadrangle: Fuller, 03  
 Ganister in Blair Co.: Butts, 09  
 Garnet, southeastern Pa.: Hopkins (T C), 01a  
 General: Lesley, 92; Rath, 88; Rogers (H D),  
 36a, 38-42, 58  
 Glass sands: Fettke, 18a; Juniata district:  
 D'Invilliers, 91  
 Gold: Wetherill, 53  
 Graphite: Law, 06; Miller (B L), 12a, e, 13  
 Chester Co.: Beattie, 12; Frazer, 81b  
 southeastern Pa.: Hopkins (T C), 01a  
 Gravel and sand in Pittsburgh district: Shaw  
 (E W), 10  
 Johnstown area: Phalen, 10, 11a  
 Kittanning and Rural Valley quadrangles:  
 Butts, 06a  
 Greene Co.: Stevenson, 76  
 Huntingdon Co.: White (I C), 85  
 Indiana quadrangle: Richardson (G B), 04a  
 Iron: Hunt, 76; Lesley, 83a; Putnam, 86;  
 Rogers (H D), 40, 41, 58  
 Armstrong Co.: Platt (W G), 80  
 Beaver Creek district: Johnson (W R), 39b  
 Bedford Co.: Lesley, 73c  
 Berks Co.: D'Invilliers, 83; Hunt, 76a;  
 Spencer (A C), 07  
 Bloomsburg ore: Van Ingen, 09  
 Bradford Co.: Claypole, 83b



## Pennsylvania—Continued.

*Economic geology*—Continued.

- Iron: Bucks Co., Buckingham Mountains: Trego, 73  
 Cambria Co.: Platt (F), 77  
 Cameron Co.: Ashburner, 85b  
 Centre Co.: D'Invilliers, 84, 84a  
 Clinton ore, Juniata district: Dewees, 78  
 Perry Co.: Claypole, 85  
 Stone Valley: Kelly, 09; Rutledge, 08  
 Cumberland-Lebanon Valley: D'Invilliers, 87a  
 Danville: Stoek, 92  
 Franklin Co.: Lesley, 65  
 hematite ore, Durham: Bayley, 12  
 genesis: Catlett, 08a; Chance, 08e  
 Lehigh Co.: Prime, 75, 78  
 South Mountain: Harden (J W), 73  
 Huntingdon and Centre cos.: Genth, 74; Lesley, 74c  
 Huntingdon Co.: Billin, 85; White (I C), 85; Nittany valley: D'Invilliers, 85  
 Indiana Co.: Hall (R D N), 11  
 Johnstown area: Phalen, 11a  
 Juniata district: D'Invilliers, 91  
 Kittanning and Rural Valley quadrangles: Butts, 06a  
 Kittatinny Valley: Rogers (H D), 38  
 Lancaster Co.: Frazer, 80  
 Lebanon Co.: Spencer (A C), 07  
 Lehigh Co.: Prime, 75a  
 limonite: Hopkins (T C), 00c, e  
 genesis: Garrison, 04  
 southeastern Pa.: Frazer, 78  
 York and Adams cos., origin: Frazer, 75h  
 Lycoming Valley: Hodge (J T), 53a; Meyer (A), 82a  
 magnetite deposits: Spencer (A C), 08a  
 eastern Pa.: Willis, 86  
 Berks and Lebanon cos.: Spencer (A C), 07  
 Cornwall, Lebanon Co.: D'Invilliers, 86a; Lesley, 86b; Wilson (E B), 11  
 Dillsburg ores: Harder, 10e, g; Jauss mine: Spencer (A C), 10  
 Mercersburg-Chambersburg district: Stose, 09  
 middle Pa.: Lesley, 71, 73d  
 Montgomery Co.: Lewis (H C), 80l, q  
 Nittany Valley, Huntingdon and Centre cos.: Lesley, 74  
 Somerset Co.: Platt (F), 77a  
 southeastern Pa.: Frazer, 82  
 southern Pa.: Silliman (jr), 72a  
 South Mountain: Lesley, 73b  
 southwestern Pa.: Ashley, 08c; Pechin, 75  
 western Pa.: Stevenson, 77  
 York and Adams cos.: Frazer, 76, 77  
 York Co.: Frazer, 77b, 86a  
 Youghiogheny Valley: Platt (F), 76  
 Jefferson Co.: Platt (W G), 81  
 Juniata Co.: D'Invilliers, 91  
 Juniata district: Lesley, 78  
 Kaolin, Delaware and Chester cos.: Lesley, 86c  
 Delaware Co., Brandywine Summit beds: Ashburner, 86e  
 southeastern Pa.: Hopkins (T C), 99  
 Kittanning quadrangle: Butts, 04  
 Kittatinny Valley: Rogers (H D), 58

## Pennsylvania—Continued.

*Economic geology*—Continued.

- Lackawanna coal basin: Rogers (H D), 54  
 Lancaster Co.: Frazer, 80  
 Latrobe quadrangle: Campbell (M R), 04  
 Lawrence Co.: White (I C), 79  
 Lead, Blair Co.: Platt (F), 81a; Sunbury: Johnson (J W), 43  
 Lehigh Co.: Lesley, 83a; Miller (B L), 14; Prime, 75, 78  
 Lignite, Montgomery Co.: Lewis (H C), 80j, l; south central Pa.: Lesley, 65  
 Limestone: Eckel, 13; Frazer, 76e; Frear, 13; Halberstadt, 10  
 Amity quadrangle: Clapp (F G), 07c  
 Cumberland Co., analyses: Lesley, 78b, 79c  
 Cumberland-Lebanon Valley: D'Invilliers, 87a  
 Johnstown area: Phalen, 10, 11a  
 Juniata district: D'Invilliers, 91  
 Kittanning and Rural Valley quadrangles: Butts, 06a  
 Siluro-Cambrian limestones, composition: Lesley, 79a  
 southwestern Pa.: Clapp (F G), 05  
 western Pa.: Stone (R W), 08d  
 York Valley: Jandorf, 12  
 Lycoming Co.: Sherwood, 80  
 McKean Co.: Ashburner, 80; Jones (N F), 81  
 Manganese: Harder, 10  
 Masontown quadrangle: Campbell (M R), 02a  
 Mercer Co.: White (I C), 80  
 Mesozoic ores: Frazer, 77g  
 Mifflin Co.: D'Invilliers, 91  
 Mineral pigments: Miller (B L), 11a, b  
 Lehigh Gap, paint ore: Agthe, 10; Eckel, 07a, d; Hesse, 91; Hill (F A), 87a  
 Mineral production: Hice, 12a, 15; Pa Top G S Com, 15  
 Monroe Co.: White (I C), 82  
 Montgomery Co.: Carter, 84  
 Mount Holly Springs, phosphorus ore: Stose, 07a  
 Natural gas: Ashburner, 86h, 87; Carll, 86, 87, 87a; Clapp (F G), 11d; Lesley, 86d; Newberry, 71k  
 Amity quadrangle: Clapp (F G), 07a, c  
 Barnesboro and Patton quadrangles: Campbell (M R), 13a  
 Beaver quadrangle: Woolsey, 05, 06a  
 Brownsville quadrangle: Fuller, 03b  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Burgettstown and Claysville quadrangles: Griswold, 07a  
 Carnegie quadrangle: Munn, 11a  
 Clarion quadrangle: Munn, 10a; Shaw (E W), 11e  
 Claysville quadrangle: Munn, 12  
 Elders Ridge quadrangle: Stone (R W), 05b  
 Foxburg quadrangle: Shaw (E W), 11b, e  
 Greene Co.: Stone (R W), 04a, 07a  
 Hyner pool, Clinton Co.: Fuller, 04d  
 Kittanning quadrangle: Butts, 04, 06a  
 Pittsburgh region: Cummins, 92  
 Punxsutawney quadrangle: Ashley, 13  
 Rogersville quadrangle: Clapp (F G), 07b



**Pennsylvania—Continued.***Economic geology—Continued.*

Natural gas: Sewickley quadrangle: Munn, 10, 11

southwestern Pa.: Pa G S, 16

Warren quadrangle: Butts, 10

western Pa.: Carll, 90; Munn, 03

Westmoreland Co.: Lesley, 91

Nickel, Lancaster Co.: Frazer, 80; Kemp, 95c

Northampton Co.: Lesley, 83a

Ocher deposits: Stoddard, 10

Mercersburg-Chambersburg district: Stose, 09

Patton quadrangle: Campbell (M R), 13a

Pawpaw and Hancock quadrangles: Stose, 12b

Perry Co.: Claypole, 85

Petroleum: Ashburner, 78a, 86g, 87, 87a; Carll, 80, 86, 87; Clapp (F G), 09a; Clark (H R), 62; Day (D T), 02; Fuller, 17; Gillelen, 64; Henry, 73; Lesley, 66, 77; Munn, 09; Rogers (H D), 60, 66; Sayles, 65; Wrigley, 75, 79, 82; Wright (W), 65

Amity quadrangle: Clapp (F G), 07a, c

Appalachian fields, present and future: Clapp (F G), 10b

Beaver quadrangle: Woolsey, 05, 06a

black shales: Ashley, 17

Bradford district: Ashburner, 79b, 80c, d

Brady's Bend, Armstrong Co.: Lesley, 73a

Burgettstown and Carnegie quadrangles: Shaw (E W), 11d

Burgettstown and Claysville quadrangles: Griswold, 07, 07a

Butler Co.: Chance, 79

Carnegie quadrangle: Munn, 11a

Clarion Co.: Chance, 80b

Clarion quadrangle: Munn, 10, 10a; Shaw (E W), 11e

Claysville quadrangle: Munn, 12

Crawford Co.: White (I C), 81

Erie Co.: White (I C), 81

Foxburg quadrangle: Shaw (E W), 11b, e

Gaines field: Fuller, 02a, 03

Greene Co.: Clapp (F G), 06; Stone (R W), 04a, 07c

Kittanning quadrangle: Butts, 04, 06a

Lawrence Co.: Lesley, 75b

McKean Co.: Ashburner, 80

Oil Creek: Ridgway, 63

oil sands: Ashburner, 78a, 79a; Bradford and Venango districts: Ashburner, 80d; origin: Day (D T), 97

Rogersville quadrangle: Clapp (F G), 07b

Sewickley quadrangle: Munn, 10, 11

southwestern Pa.: Pa G S, 16

Venango district: Carll, 75; Eaton (S J M), 66; Nettleton, 77

Warren district: Butts, 10; Carll, 83

well records: Carll, 77

western Pa.: Carll, 90; Lucas (D J), 75; Munn, 08

Philadelphia district: Bascom, 09a

Phosphate, Juniata Co.: Ihlseng, 96

Pike Co.: White (I C), 82

Pipe ore, origin: Lesley, 79e

Pyrite in coal: Leighton (H), 18

Road-making materials: Ihlseng, 00

Rogersville quadrangle: Clapp (F G), 07b

Rural Valley quadrangle: Butts, 05a

**Pennsylvania—Continued.***Economic geology—Continued.*

Salt: Pierce, 27

Sand, anthracite basin: Darton, 13

Pittsburgh district: Shaw (E W), 10

Scranton region: Darton, 12

Sandstone, southwestern Pa.: Stone (R W), 08e

Schuylkill Co.: Sheaffer, 54

Scranton region: Darton, 12

Sewickley quadrangle: Munn, 10, 11

Shale, Johnstown area: Phalen, 10, 11a; southwestern Pa.: Ashley, 08c

Silver-lead, Phoenixville: Blake (W P), 60a

Slate: Dale, 06c; Merrill (G P), 89d; Merriman, 98

Lancaster Co.: Frazer, 80

Northampton, Lehigh, and Berks cos.: Lesley, 83a

Peach Bottom deposits: Ferguson (E G W), 10

Slatington: Dale, 03

Somerset Co.: Platt (F), 77a

Snyder Co.: D'Inwilliers, 91

Southwestern Pa.: Ashley, 08c

Sullivan Co.: Sherwood, 80

Susquehanna Co.: White (I C), 81a

Susquehanna River region: White (I C), 83

Talc, Easton: Peck, 05

Talc and serpentine, Northampton Co.: Peck, 11

Tioga quadrangle: Fuller, 03a

Trap, Chester Co.: Rand, 98

Trenton quadrangle: Bascom, 09b

Union Co.: D'Inwilliers, 91

Uniontown quadrangle: Campbell (M R), 02a

Uranium-vanadium ores, origin: Notestein, 18

Warren Co.: Carll, 83

Warren quadrangle: Butts, 10

Washington Co.: Stevenson, 76

Wayne Co.: White (I C), 81a

Waynesburg quadrangle: Stone (R W), 05

Westmoreland Co.: Stevenson, 77, 78a; Mur-raysville gas well: Lesley, 79d

York Co.: Fraser, 76, 77

York Valley limestone belt: Jandorf, 12

Zinc, Blair Co.: Platt (F), 81a

Lancaster Co.: Fraser, 80

Lehigh Co.: Drinker, 73

*Historical geology.*

Accident and Grantsville quadrangles: Martin (G C), 08a

Adams Co.: Frazer, 76, 77; map: Pa G S, 2d, 76a

Allegheny coal field: Whittlesey, 74a

Allegheny Co.: Jillson, 66; Stevenson, 76, 77

Allegheny Mountains, Johnstown region: Miller (E), 35

Allegheny Valley: Williams (E H), 13

Allegheny series: White (D), 00a

Altoona section, Devonian: Butts, 06

Amity quadrangle: Clapp (F G), 07a, c

Anthracite fields: Ashburner, 84d; Lyman, 96; Rothwell, 69; map: Fisher, 36; Pa G S, 2d, 90

northern: Darton, 13b; Hill (F A), 87c

sections: Griffith, 13

southern: Wasmuth, 88b

stratification: Wasmuth, 87



## Pennsylvania—Continued.

*Historical geology*—Continued.

- Anthracite region: Ashburner, 86b; Hill (F A), 87; Rogers (H D), 38; Smith (A D), 95  
atlas: Ashburner, 83a  
Panther Creek Basin: Ashburner, 83  
Appalachian folds: Chamberlin (R T), 10  
Appalachian region: Rogers (H D), 38  
Archbald potholes: Ashburner, 86f  
Archean-Paleozoic contact, southeastern Pa.: Fraser, 84f  
Armstrong Co.: Platt (W G), 80  
Atlas: Lesley, 85  
Azoic, southeastern Pa.: Hunt, 78  
Barnesboro quadrangle: Campbell (M R), 13a  
Beaver Co.: White (I C), 76  
Beaver quadrangle: Woolsey, 05, 06a  
Beaver River district: White (I C), 78  
Bedford Co.: Stevenson, 85  
Berea formation: Verwiebe, 16  
Berks Co.: D'Invilliers, 83; map: Pa G S, 2d, 91  
Bituminous coal field: White (D), 02  
Blair and Huntingdon cos. section: Butts, 18  
Blair Co.: Platt (F), 78a, 81a; Tipton: White (D), 01a  
Bloomsburg iron ore, stratigraphic position: Van Ingen, 09  
Borings: Carll, 77  
Armstrong Co.: Lesley, 73a  
Boyd's Hill well, Pittsburgh: Lesley, 76a  
Bucks Co.: Lesley, 91a  
Clearfield Co.: Hale (J M), 65  
Clinton Co.: Chance, 78a  
East Shamburg: Hall, 74  
McDonald oil field: Am G, 93; White (I C), 97, 18  
McKean and Elk cos.: Ashburner, 79  
Parkesburg, Chester Co.: Lesley, 91b  
petroleum region: Lesley, 66, 77  
Philadelphia region: Carter (O C S), 94a  
Potter Co.: Ashburner, 86  
Scranton: Sheafer, 69  
southeastern Pa.: Carter (O C S), 91  
Venango Co.: Nettleton, 77  
western Pa.: Carll, 90; Lesley, 65a  
Wilkes-Barre: Sheafer, 70  
Boulder, granite, Pittsburgh: Gresley, 96a  
Boyertown Hills, eastern Pa.: Jonas, 17  
Bradford Co.: Horton, 59; Lesley, 78a; Sherwood, 78  
Bradfordian rocks: Girty, 04e  
Broadtop coal field: Gardner (J H), 13a; map: Gardner (J H), 14  
Brownsville quadrangle: Campbell (M R), 03  
Bryn Mawr gravel, southeastern Pa.: Lewis (H C), 80f  
Bucks Co.: Hall (C E), 81  
Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
Burgettstown and Claysville quadrangles: Griswold, 07a  
Butler Co.: Chance, 79  
Cambria Co.: Platt (F), 77  
Cambrian: Walcott, 92c, 94d, 96a  
Lancaster Co.: Roddy, 09  
Montgomery Co.: Rand, 80d

## Pennsylvania—Continued.

*Historical geology*—Continued.

- Cambro-Ordovician limestones of Appalachian Valley: Stose, 08  
Cameron Co.: Sheafer, 85  
Carbon Co.: Ashburner, 84a; map: Pa G S, 2d, 91  
Carboniferous: Eaton (A), 33; Stevenson, 87c, 06; Taylor (R C), 36; Weaver, 37  
Appalachian basin: Stevenson, 04  
structural features: Wasmuth, 88a  
Carboniferous conglomerate, Sullivan Co.: Lyman, 67  
Catoclin belt: Keith, 94a  
Catskill formation: Claypole, 83; Fuller, 02c; Lesley, 83d  
Catskill Range: Hall, 76c  
Cement belt, Lehigh and Northampton cos.: Peck, 04b  
Central Pa., siliceous oolites: Ziegler, 12  
Centre Co.: D'Invilliers, 84; Ewing, 84; Taylor (R C), 32  
Chemung group: Hall, 85f; Lilley, 84, 86  
Chester Co.: Finch (J), 28; Frazer, 83, 83a, b, c, 84; Hartman, 57; Lesley, 83; Rogers (H D), 53; Smith (J L), 56b; Doe Run-Avondale region: Bliss (E F), 16  
Chester Valley: Hall (C E), 83; Rand, 83, 84  
Chester Valley sandstones: Rand, 91a  
Clarion Co.: Chance, 80b  
Claysville quadrangle: Munn, 12  
Clearfield Co.: Chance, 84; Johnson (W R), 39; Kemp, 93f; Platt (F), 75  
Clinton Co.: Chance, 80; Paleozoic section: Chance, 78  
Clinton group, Perry Co.: Claypole, 84e  
Coal beds in Subcarboniferous: Lesley, 75c  
Coal Measures: Lesley, 58a; Lyell, 42a; Ramsay, 96; White (I C), 74a, 91  
Beaver Co.: White (I C), 74  
Blair Co.: White (I C), 89  
lower productive: Adams (T K), 03  
Coatesville quadrangle, Pa.: Bliss (E F), 14;  
Columbia Co.: White (I C), 83  
Conemaugh sections: Raymond (P E), 09a  
Connellsville quadrangle: Campbell (M R), 03  
Crawford Co.: White (I C), 81  
Crystalline rocks, eastern Pa.: Frazer, 83d  
Cumberland basin: Jones (H G), 81  
Cumberland Co.: Frazer, 77; map: Pa G S, 2d, 76a  
Cumberland-Lebanon Valley shales, age: Stose, 17  
Dauphin Co., map: Pa G S, 2d, 91  
Deep wells: White (I C), 18  
Delaware Co.: Hall (C E), 85; Rand, 82a, 87; Smith (G), 62; Radnor: Rand, 82  
Delaware River clays, Philadelphia: Woolman, 90a  
Delaware water gap: Chance, 82b  
Devonian: Claypole, 91b; Williams (H S), 05  
Altoona: Butts, 06  
Bradford Co.: Claypole, 83b  
eastern Pa.: Prosser, 92b, 95  
shales: Verwiebe, 17a  
southwestern Pa.: Stevenson, 78c  
upper: Barrell, 13a  
Eastern Pa.: Hunt, 77b



## Pennsylvania—Continued.

*Historical geology—Continued.*

Easton: Finch (J), 24; Peck, 01  
 Ebensburg quadrangle: Butts, 05b  
 Elders Ridge quadrangle: Stone (R W), 05a, b  
 Elk Co.: Ashburner, 85a; St. Marys: Ashburner, 81  
 Elkland quadrangle: Fuller, 03a  
 Erie Co.: White (I C), 81  
 Fayette Co.: Stevenson, 77, 78a  
 Forest Co.: Ashburner, 85a  
 Foxburg and Clarion quadrangles: Shaw (E W), 11e  
 Franklin Co.: Frazer, 77; map: Pa G S, 2d, 76a  
 Fulton Co.: Stevenson, 85  
 Gaines quadrangle: Fuller, 03  
 General: Aikin, 34; Claypole, 87a; Frazer, 83a; Hildreth, 35; Hopkins (T C), 97e; Leeds, 71; Lesley, 92; Rogers (H D), 36a, 38-42, 49, 58; Taylor (R C), 34a; Williams (G H), 94b; Woodworth, 94d  
 Geologic history: Davis (W M), 89f  
 Geologic map: Rogers (H D), 58g  
   anthracite fields: Rogers (H D), 58h  
   southwestern Pa.: Pa G S, 14a  
 Greene Co.: Stevenson, 76  
 Hamilton sandstone: Claypole, 84k  
 Helderberg limestone: Rceside, 17  
 Huntingdon Co.: Ashburner, 75; White (I C), 85; Aughwick Valley: Ashburner, 78; Paleozoic section: Ashburner, 76  
 Indiana Co.: Anderson (W), 60; Platt (W G), 78  
 Indiana quadrangle: Richardson (G B), 04a  
 Jefferson Co.: Platt (W G), 81  
 Johnstown quadrangle: Phalen, 10, 11a  
 Juniata Co.: D'Invilliers, 91  
 Juniata district: Dewees, 78; Lesley, 78  
 Kingsmill white sandstone: Claypole, 83d  
 Kittanning quadrangle: Butts, 04, 06a  
 Kittatinny Valley: Rogers (H D), 58  
 Lackawanna coal basin: Rogers (H D), 54  
 Lackawanna Co.: White (I C), 83  
 Lancaster Co.: Frazer, 78b, 80; Martie anticlinal: Frazer, 78e  
 Latrobe quadrangle: Campbell (M R), 04  
 Lawrence Co.: White (I C), 79  
 Lehigh and Northampton cos.: Peck, 08; basal conglomerate: Peck, 04  
 Lehigh Co.: Lesley, 83a; Miller (B L), 14; Prime, 75, 75a, 78, 78a  
 Lehigh district: Peck, 11; early Paleozoic: Wherry, 09b  
 Lehigh Gap, section: Eckel, 07d  
 Lehigh River section: Hill (F A), 87b; Winslow, 87  
 Lehigh water gap: Chance, 82c  
 Lockatong formation, Triassic: Hawkins, 14  
 Lodel Creek and Skippack Creek: Lyman, 02  
 Lower Carboniferous: Rogers (W B), 59d  
 Luzerne Co.: White (I C), 83  
 Lycoming Co.: Meyer (A), 93, 93a; Sherwood, 80; Mountain limestone: Meyer (A), 90  
 McKean Co.: Ashburner, 80; Jones (N F), 81  
 McDonald deep well: White (I C), 13a  
 Mansfield: Teschemacher, 43a  
 Martinsburg shale: Hintze, 18

## Pennsylvania—Continued.

*Historical geology—Continued.*

Masontown quadrangle: Campbell (M R), 02a  
 Mauch Chunk: Stevenson, 02; shale: Barrell, 07a  
 Meadville area: Smallwood, 03  
 Medina and Shawangunk: Grabau, 09a  
 Mercer Co.: Griswold, 84; White (I C), 80  
 Mercer group, age: White (D), 03d  
 Mercersburg-Chambersburg district: Stose, 09  
 Mesozoic sandstone, age: Cope, 66c  
 Metamorphic strata: Rogers (H D), 57  
 Mifflin Co.: D'Invilliers, 91  
 Millstone grit: Chance, 81a  
 Mississippian: Chance, 80a; Verwiebe, 17  
 Monroe Co.: White (I C), 82  
 Montgomery Co.: Carter, 84; Hall (C E), 81  
 Merion, Montgomery Co.: Rand, 82a  
 Montgomery Co., volcanic rocks: Goldsmith, 98  
 Montour Co.: White (I C), 83  
 Morea, mammoth bed: Williams (E H), 96  
 Newark group: Lea, 51, 53; Wherry, 12e  
 Newark series, Philadelphia district, terrestrial origin: Morningstar, 16  
 Northampton Co.: Lesley, 83a; Prime, 78a  
 Northern Pa.: Taylor (R C), 35e  
 Northumberland Co.: White (I C), 83  
 Northwestern Pa.: Lesley, 75a  
 Oil Creek region: Ridgway, 63  
 Oil regions: Carll, 80  
 Oil sands: Ashburner, 79a  
 Onondaga formation: Kindle, 12  
 Ordovician, Bellefonte: Collie, 03; York: Frazer, 75d  
 Oriskany sandstone, Lycoming Co.: Woolman, 86  
 Paleozoic, early: Foerste, 93b  
 Paleozoic section, Huntingdon Co.: Ashburner, 77  
 Panther Creek Valley: Richards (W B), 13  
 Patton quadrangle: Campbell (M R), 13a  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Peach Bottom slates, York and Lancaster cos.: Fraser, 84c; Ordovician age: Fraser, 80b  
 Perry Co.: Claypole, 85; Rafinesque, 39a  
   fault: Claypole, 84a  
   Hamilton beds: Claypole, 84c  
   map: Dewees, 85  
 Philadelphia Co.: Hall (C E), 81; Jewell, 56  
 Philadelphia district: Bascom, 04, 09a; Browne (P A), 32, 32a; Lewis (H C), 83b, c; Rand, 77, 82a, 89; Smith (A H), 86; Troost, 26  
 Philadelphia gneisses: Hitchcock (C H), 84b  
 Philadelphia-Norristown: Brown (R), 34  
 Piedmont district: Bascom, 05  
 Piedmont formations: Mathews, 05  
 Pike Co.: White (I C), 82  
 Pittsburgh, local geology: Raymond (P E), 11e; Shaw (E W), 11j  
 Pittsburgh coal: Gresley, 94; White (I C), 98a  
 Pittsburgh coal region: D'Invilliers, 86, 87; Lesley, 86e  
 Pocono rocks, Armstrong Co.: Campbell (M R), 03f  
 Port Kennedy bone cave: Mercer, 95, 99  
 Portage beds, Perry Co.: Claypole, 84b  
 Potsdam outcrop, Chester Valley: Lewis (H C), 80 p



## Pennsylvania—Continued.

*Historical geology*—Continued.

- Potter Co.: Sherwood, 80a; sections: Ashburner, 80a  
 Pottsville formation: Grabau, 06b; White (D), 00  
 Pre-Cambrian, Piedmont region: Bascom, 09, 15  
 Pre-Cambrian and Triassic diabase, eastern Pa.: Jonas, 17  
 Pre-Cambrian sedimentary rocks in Highlands of eastern Pa.: Wherry, 18a  
 Pre-Pennsylvanian stratigraphy: Butts, 08a  
 Pyrophyllite slates, Lycoming Co.: Meyer (A), 93a  
 Radnor, Delaware Co.: Rand, 82  
 Reading area: Wherry, 16d  
 Rogersville quadrangle: Clapp (F G), 07b  
 Rural Valley quadrangle: Butts, 05a, 06a  
 Sadsbury steatite, Chester Co.: Rand, 95  
 Schuylkill Co.: Lyman, 93a; Sheaffer, 54  
 map: Pa G S, 2d, 91  
 New Boston basin: Lyman, 89  
 Schuylkill water gap: Chance, 82a  
 Section across Alleghany Mountains: Lesley, 69a  
 Serpentine belt, Bucks Co.: Lewis (H C), 80k  
 Chester Co.: Frazer, 84b  
 Delaware Co.: Rand, 79, 80, 80f, 82  
 eastern Pa.: Rand, 90a, 96a  
 Lafayette: Rand, 86  
 Philadelphia area: Jonas, 05  
 southeastern Pa.: Chester (F D), 88  
 Sewickley quadrangle: Munn, 11  
 Sharon conglomerate, position: White (I C), 81b  
 Shawangunk grit: Billingsley, 10  
 Silurian: Schuchert, 16a  
 Silurian limestone of Milesburg Gap, Bellefonte: Brown (T C), 13  
 Silurian shore and off-shore deposits: Van Ingen, 11  
 Slippery Rock Creek section: Lesley, 75b  
 Snyder Co.: D'Invilliers, 91  
 Somerset Co.: Lesley, 71a; Platt (F), 77a; Wellersburg basin: Lesley, 86a  
 South (Chester) Valley: Rand, 91  
 South (Chester) Valley Hill: Frazer, 82a; Rand, 93  
 South Mountain: Blandy, 79; Eaton (H N), 12; Frazer, 84a; Leidy, 82; Stose, 03, 06; volcanic rocks: Bascom, 96; Williams (G H), 92  
 Southeastern Pa.: Frazer, 82; Hall (C E), 80a; Hunt, 78; Rand, 00; Rogers (H D), 40, 41  
 Southwestern Pa.: Ashley, 08b; Pechin, 75  
 Subcarboniferous: Chance, 80a  
 Sullivan Co.: Sherwood, 80; Bernice coal basin: Ashburner, 86d  
 Susquehanna Co.: White (I C), 81a  
 Susquehanna Gap: Van Ingen, 08  
 Susquehanna River region: White (I C), 83  
 Tioga Co.: Lesley, 78a; Sherwood, 78  
 Tioga quadrangle: Fuller, 03a  
 Trap, Dauphin and Cumberland cos.: Gibson, 25  
 Trap dikes, Chester Co.: Frazer, 96; Rand, 96; southeastern Pa.: Hunt, 78; Lewis (H C), 85  
 Traps, Mesozoic: Frazer, 75a

## Pennsylvania—Continued.

*Historical geology*—Continued.

- Trenton quadrangle: Bascom, 09b  
 Triassic: Wheatley, 61; Wherry, 12b, 13  
 Bucks and Montgomery cos.: Lyman, 95  
 Bucks Co.: Lyman, 91  
 Gwynned: Lea, 57a  
 Piedmont Plateau: Jonas, 17  
 southeastern Pa.: Lyman, 94a  
 York Co.: Frazer, 75e  
 Triassic igneous rocks, Gettysburg: Stose, 16  
 Unconformity between Mississippian and Pennsylvanian: Butts, 08  
 Union Co.: D'Invilliers, 91  
 Uniontown quadrangle: Campbell (M R), 02a  
 Venango district: Carll, 75  
 Warren Co.: Carll, 83  
 Warren district: Randall, 75  
 Warren quadrangle: Butts, 10  
 Washington Co.: Stevenson, 76; Mississippian: Linn, 86  
 Wayne Co.: White (I C), 81a  
 Waynesburg quadrangle: Stone (R W), 05  
 Western Pa.: Butts, 02; Rogers (H D), 40  
 Westmoreland Co.: Stevenson, 77, 78a; Mur-raysville gas well: Lesley, 79d  
 Wilkes-Barre, anthracite: Maclure, 24  
 Wissahickon mica gneiss, Doe Run-Avondale district: Bliss (E F), 14  
 Wyoming Co.: White (I C), 83; map: Sherwood, 82  
 Wyoming Valley, limestone beds: Ashburner, 86c  
 York Co.: Ehrenfeld, 98; Frazer, 75f, 76, 77, 86a; Lesley, 80d  
 Youghiogheny Valley: Platt (F), 76
- Mineralogy.*  
 Alunogen, Schuylkill Co.: Reinhold, 82  
 Andalusite, Delaware Co.: Dana (E S), 72b  
 Anhydrite, Delaware Co.: Koenig, 89, 89c  
 Ankerite, Phoenixville: Koenig, 78a  
 Aquacryptite: Lewis (H C), 82h; West Chester: Shepard, 68  
 Argentine, Delaware Co.: Gordon (S G), 16  
 Axinite, Bethlehem: Frazier, 82; Delaware Co.: Wherry, 14a  
 Beraunite, Northampton Co.: Wherry, 14a  
 Berks Co.: Smith (E F), 10  
 Calcite, lamellar, Delaware Co.: Gordon (S G), 16  
 Carnotite: Wherry, 09, 12a  
 Catalog of minerals: Eyerman, 89  
 Celestine, Blair Co.: Young (C A), 75  
 Chalcopyrite, Chester Co.: Penfield, 90b  
 Chemical analyses: Eyerman, 11  
 Chester Co.: Carpenter (G W), 28; Finch (J), 28; Lea, 67; Rand, 92; Smith (J L), 56b; Brinton's quarry: McKinstry, 16  
 French Creek mines: Chamberlin (B B), 87; Eyerman, 89a  
 "Chlinochlore," Chester Co.: Craw, 52  
 Chlorite, Chester Co.: Blake (W P), 51  
 Columbite, Delaware Co.: Genth, 89; Lewis (H C), 82f  
 Corundum, Lehigh Co.: Smith (E F), 82  
 Damourite, Berks Co.: Genth, 82a  
 Delaware Co.: Genth, 85a; Hall (C E), 85; Koenig, 78d; Rand, 92



## Pennsylvania.—Continued.

*Mineralogy*—Continued.

- Descloizite: Smith (J L), 69b  
 Diaspore, Newlin: Dana (E S), 86e  
 Dopplerite-like substance, Scranton: Lewis (H C), 82i  
 Easton: Eyerman, 92a; Finch (J), 24  
 Emerald nickel, Texas: Silliman (jr), 48  
 Euxenite, Delaware Co.: Law, 07  
 Fahlnite, Philadelphia: Lewis (H C), 82g  
 Feldspar: Lea, 66  
 Gahnite, Delaware Co.: Genth, 89  
 Galena, Lebanon Co.: Brush, 63  
 Garnet, titaniferous, Darby, Delaware Co.: Keller, 82  
 General: Brown (A P), 13; Eyerman, 89; Genth, 75, 76; Godon, 14  
 Glauberite crystal cavities, Bucks Co.: Wherry, 16g  
 Glaucofane, eastern Pa.: Bliss (E F), 13  
 Jefferisite: Brush, 66  
 Lancasterite: Silliman (jr), 50  
 Lansfordite, Schuylkill Co.: Genth, 88, 90a  
 Lanthanite, Lehigh Co.: Blake (W P), 53  
 Lebanon Co.: Eyermann, 89b  
 Leidyite, Delaware Co.: Koenig, 78  
 Lesleyite: Sharples, 69; Chester Co.: Smith (J L), 69c  
 Limonite pseudomorphous after pyrite, Lancaster Co.: Willig, 18  
 Magnetite, Pennsbury: Dana (J D), 69  
 Manganese, Wilkes-Barre: Cist, 21  
 Melanite: Wister, 14  
 Melanosiderite, Delaware Co.: Cooke (J P), 75  
 Meteorites, Bald Eagle, Williamsport: Ward (H A), 02a  
 Millers Run: Cohen, 04a  
 Mount Joy, Adams Co.: Howell, 92  
 Pittsburgh: Silliman (jr), 51b  
 Shrewsbury: Farrington, 10a  
 Williamsport: Owens, 92  
 Mica, with inclosures, Chester Co.: Rand, 80c  
 Molybdenite: Wetherill, 53; Frankford: Brown (A P), 96  
 Molybdate of lead, Chester Co.: Wetherill, 52  
 Monazite, Delaware Co.: Hamilton, 99b  
 Muscovite, enclosures: Lewis (H C), 83g  
 Nesquehonite, Schuylkill Co.: Genth, 90a  
 Newark group: Wherry, 10  
 Newlin township, Chester Co.: Sharples, 69  
 Pattersonite: Sharples, 69  
 Philadelphia: Bengé, 06; Genth, 81; Lea, 18; Lewis (H C), 85a; Rand, 72, 92; philadelphite: Lewis (H C), 80o  
 Phytocollite, Scranton: Lewis (H C), 82b, i, j  
 Piedmontite and scheelite, South Mountain: Williams (G H), 93c  
 Pyrite, Cornwall: Travis, 06  
 Delaware Co.: Penfield, 89a  
 French Creek: Nicol, 04  
 Lancaster Co.: Boye, 52  
 Pyrophyllite, Schuylkill Co.: Genth, 80; Reinhold, 82  
 Quartz inclusions, Bucks Co.: Bilgram, 04  
 Radioactive minerals: Wherry, 08  
 Randite, Philadelphia: Koenig, 79a; Rand, 80b  
 Rhodophyllite, Lancaster Co.: Genth, 52a

## Pennsylvania—Continued.

*Mineralogy*—Continued.

- Scapolite: Wherry, 07a  
 Serpentine, alteration to quartz, Delaware Co.: Rand, 80a  
 Serpentine beds, Chester and Delaware cos.: Willcox, 83  
 Strontianite and other minerals, Mifflin Co.: Lewis (H C), 76  
 Sundry minerals: Genth, 82; Goldsmith, 93  
 Sylmar: Wherry, 18f  
 Tabular spar, Bucks Co.: Morton, 29  
 Talc, exfoliating, Manayunk: Lewis (H C), 80a  
 Uwarowite, Texas: Shepard, 66  
 Vanadium, Philadelphia: Lewis (H C), 80d  
 Vermiculites, Delaware Co.: Cooke (J P), 75a  
 Wavellite, Lehigh Co.: Smith (E F), 82; Northampton Co.: Wherry, 18g  
 Zcolites, Delaware Co.: Koenig, 83  
 Zircon: Wetherill, 53

*Paleontology*.

- Aeonia, Bedford Co.: Haldeman, 47  
 Allegheny and Conemaugh faunas: Raymond (P E), 10c, 11b  
 Amphibian footprints, Schuylkill Co.: Mason, 78; Warren Co., Devonian: Marsh, 96d  
 Bison: Rhoads, 95  
 Bone bed, Phoenixville: Wheatley, 61  
 Bone caves: Leidy, 80  
 Buthotrephis, York Co.: Lesley, 80d  
 Calamites: Gresley, 93a  
 Calamops paludosus (labyrinthodont), Triassic: Sinclair, 17  
 Cambrian: Walcott, 10; Lancaster Co.: Roddy, 09  
 Carbondale, coal plants: Teschemacher, 47  
 Carboniferous: Girty, 08a  
 cockroach, Pittstown: Scudder, 77c  
 plants: Kimball, 57; Lesquereux, 54, 58, 58a, 77, 80  
 Wilkes-Barre: Claypole, 86  
 Catalog of fossils: Hall (C E), 80; Lesley, 89  
 Catskill: Claypole, 83; Pisces: Cope, 92b  
 Ceratiocaridae, Chemung and Waverly groups: Beecher, 84  
 Chemung sponges, Erie: Clarke (J M), 18a  
 Clepsysaurus, Newark group: Lea, 51  
 Coal Measures, Invertebrata: Conrad, 35a  
 Cockroaches, Pennsylvania: Cockerell, 18; Scudder, 84a  
 Coleoptera, Port Kennedy bone cave: Horn, 76  
 Cordaites, bearing fruit: Lesquereux, 79  
 Crustacean, Catskill group: Claypole, 83e  
 Cypricardia leidy, Pottsville: Lea, 55  
 Devonian: Williams (H S), 05  
 Altoona: Kindle, 06a  
 vertical range of fossils: Claypole, 85c  
 Devonian and Mississippian fossils near Meadville: Millward, 09  
 Devonian plant (Dictyocordaites): Dawson (J W), 89e  
 Diatoms, Philadelphia: Cunningham, 86  
 Dictyospongidae, Chemung group: Hall, 90a  
 Dolichocephala lacoana, Wyoming Co.: Claypole, 84d  
 Elephant tooth, Erie Co.: Van Rensselaer, 28  
 Entomostraca: Jones (T R), 58b  
 Equisetum, Schuylkill Co.: Harlan, 35a



## Pennsylvania—Continued.

*Paleontology*—Continued.

- Eurypteridae: Hall, 84h; Hall (C E), 77  
 Eurypterus, Darlington shales: Mansfield (J F), 81  
 Ferns, Mansfield: Teschemacher, 43a  
 Fish, Silurian: Claypole, 84h  
 Flora of southern anthracite coal field: Unger, 07  
 Footprints: Lyell, 46b  
   Carboniferous: Moore (W D), 73; Rogers (H D), 51c  
   reptilian, Pottsville: Lea, 49, 50  
   Schuylkill Co.: Lea, 53b; Mason, 78  
   Warren Co.: Marsh, 96d  
   Westmoreland Co.: King (A T), 44, 45, 45a, b; Lyell, 46f  
   Williamstown: Leidy, 79a  
 Fucoides, Mifflin Co.: Harlan, 31a; Taylor (R C), 34  
 Fucoides alleghaniensis: Taylor (R C), 34a  
 Fungus, Coal Measures, Beaver Co.: Lesquereux, 78e  
 General: Leidy, 75a; Lesley, 89a, 92; Rogers (H D), 58c; Shaefer, 55a  
 Glacial drift fossils: Millward, 09  
 Hamilton, Pike Co.: Heilprin, 83c  
 Hartman's Cave, Stroudsburg, Monroe Co.: Darton, 85a; Mercer, 94  
 Helodus, n. sp.: Eastman, 09  
 Holoptychius, Bradford Co.: Claypole, 83b  
 Lignite, Lancaster Co.: Rogers (W B), 55a  
 Limuloid crustacean, Devonian; Williams (H S), 85  
 Lists of fossils, Paleozoic: Hall (C E), 76b  
 Mammalia: Leidy, 89  
 Mammoth, Tioga Co.: Edwards (T) 93  
 Marine fossils, new horizons for: Raymond (P E), 09b  
 Mollusca, Coal Measures, Wilkes-Barre: Lea, 53a  
 Myacites, Phoenixville: Conrad, 57d  
 Newark: Lea, 56  
   Pisces: Leidy, 76b  
   vertebrates, Phoenixville: Cope, 66a  
 Olenellus, York Co.: Wanner, 01  
 Olenopsis, Cambrian: Walcott, 10  
 Ostracoda: Jones (T R), 58a, 89  
 Palaeaspis, Perry Co.: Claypole, 92a  
 Palaeoctonus appalachianus: Cope, 77w  
 Paleozoic invertebrates: Miller (S A), 96c; Simpson (G B), 90  
   plants: Lesquereux, 87  
 Pelecypoda: Conrad, 60  
 Permian flora: Fontaine, 80  
 Perry Co.: Claypole, 85; Rafinesque, 39a  
 Phyllocarida, Chemung and Waverly groups: Beecher, 02b  
 Pisces: Newberry, 78d  
   Chemung: Claypole, 85e  
   Silurian: Claypole, 84m  
 Plantae, Carboniferous, Johnstown region: Harlan, 35  
   Devonian: Penhallow, 93  
   Mauch Chunk: Göppert, 39  
   roof of Pittsburgh coal: Grier, 14  
   Triassic: Wherry, 16b

## Pennsylvania—Continued.

*Paleontology*—Continued.

- Plantae: Westmoreland Co.: King (A T), 54a  
 Pleistocene fauna, Frankstown: Holland, 08a  
 Port Kennedy cave fauna: Cope, 71m, 95c, 96c, 99; Mercer, 99  
 Pottsville floras: White (D), 00  
 Pterichthys, Chemung: Claypole, 83c  
 Rectogloma: Van Tuyl, 14  
 Rensselacria, Hamilton group: Claypole, 83f, 84c  
 Reptilia, Triassic: Cope, 78j  
 Reptilian footmarks, Greensburg: Lyell, 48  
 Reptilian remains, Pennsylvanian near Pittsburgh: Raymond (P E), 07a  
 Reptilian tracks, Pittston: Lacoe, 82  
 Rhinoceroses: Featherstonhaugh, 31  
 Rhizomorpha, Beaver Co.: Lesquereux, 78e  
 River drift fossils, Pittston: Corss, 00  
 Rutiodon, York: Sinclair, 18  
 Saurian, Newark group: Lea, 53  
 Sauropus, Pottsville: Lea, 49, 49a, 53b  
 Scolithus casts: Wanner, 90  
 Sigillaria, Dauphin Co.: Taylor (R C), 43; Susquehanna Co.: Eaton (A), 31  
 Silicified wood, Triassic: Wherry, 12d  
 Silurian fishes: Claypole, 84, 85a  
 Spiraxis, Chemung group: Newberry, 85c, g  
 Spirodomus: Beecher, 86  
 Stenacanthus, Tioga Co.: Leidy, 56b  
 Tracks, algae, etc., Triassic, York Co.: Wanner, 89, 92  
 Triassic: Wheatley, 61  
   cycads and conifers: Brown (A P), 11  
   footprints: Hitchcock (C H), 89b  
   Phoenixville: Lea, 57; Leidy, 57a, 59b; Lewis (H C), 84e  
   Vertebrata: Cope, 78g  
   York Co.: Wanner, 89  
 Trigonocarpum, Beaver Co.: King (A T), 54b  
 Trilobites, Beekmantown: Raymond (P E), 10  
   Huntington Co.: Green (J), 37, 37a, b  
   Lowville and Black River formations: Raymond (P E), 10a  
   Walpack Ridge: Heilprin, 84d  
 Trochoceras grovaniense: Mook (R R), 15  
 Vertebrata, Paleozoic: Cope, 97  
   Pittsburgh: Case, 08b; Raymond (P E), 08a  
   post-Pliocene, eastern Pa.: Wheatley, 71  
 Westmoreland Co.: Hall (C E), 78a  
 Wyoming Valley, Carboniferous: Heilprin, 86  
 Xiphosura, Carboniferous: Packard (A S), 85; Devonian: Beecher, 02  
 York Co., Triassic flora: Wanner, 00
- Petrology.*  
 Apophyllite, South Mountain: Bascom, 97a  
 Basalt, crystallized: Smith (T P), 99  
 Boyertown Hills, eastern Pa.: Jonas, 17  
 Bradford oil sand, constitution: Ashburner, 80c  
 Catalog of rocks: Hall (C E), 78, 80  
 Chester Co., Doe Run-Avondale region: Bliss (E F), 16  
 Coatesville quadrangle: Bliss (E F), 14  
 Cone-in-cone, Devonian: Gresley, 94a  
 Dolomite, Franklin Co., analysis: McCreath, 81a



## Pennsylvania—Continued.

*Petrology*—Continued.

- Gabbro, Bucks Co.: Kemp, 93g  
 General: Frazer, 75a  
 Lancaster Co.: Frazer, 80  
 Lehigh and Northampton cos., basal conglomerate: Peck, 04  
 Montgomery Co., volcanic rocks: Goldsmith, 98  
 Newark group: Wherry, 10  
 Oolite, Bethlehem: Wherry, 15; siliceous: Barbour, 90a; Brown (T C), 14; Hovey, 94b; Moore (E S), 12; Ziegler, 12  
 Peridotite dike in coal measures: Kemp, 07b  
 Philadelphia region: Genth, 81  
 Piedmont district: Bascom, 05  
 Pre-Cambrian, eastern Pa.: Wherry, 17o, 18a  
 Rhyolite, South Mountain: Williams (G H), 93c  
 Sandstone or conglomerate, Berks Co.: Merrill (G P), 83  
 Serpentine: Rand, 87  
   Chester Co.: Chester (F D), 89  
   Easton: Peck, 01  
   Philadelphia area: Jonas, 05  
   southeastern Pa.: Chester (F D), 88  
 Serpentine and talc, Easton: Peck, 00  
 Serpentine beds, Chester and Delaware cos.: Willcox, 83  
 Serpentinous rocks: Merrill (G P), 90  
 Siluro-Cambrian limestones, composition: Lesley, 79a  
 South Mountain: Bascom, 93, 96; Williams (G H), 92  
 Sundry rocks: Goldsmith, 93  
 Talc, Easton: Peck, 01  
 Trap, Dauphin and Cumberland cos.: Gibson, 25  
   Gettysburg: Frazer, 75j  
   Lancaster Co.: Frazer, 79  
   York and Adams cos.: Frazer, 75i  
 Triassic igneous rocks, Gettysburg: Stose, 16  
 York Co.: Ehrenfeld, 98

*Physical geology*.

- Alleghany Valley erosion: Williams (E H), 13  
 Anthracite, northern field: Wasmuth, 92; southern field: Wasmuth, 88b  
 Anthracite fields, folding and faulting: Lyman, 96; stratification: Wasmuth, 87  
 Anticlinal folds, Meadville: Smallwood, 03  
 Appalachian folds: Chamberlin (R T), 10  
 Appalachian Mountains: Claypole, 84g  
 Bituminous sediment, Schuylkill River: Leidy, 76c  
 Brownsville quadrangle: Campbell (M R), 03  
 Cambrian and Ordovician rocks, origin: Brown (E P), 13  
 Caves, Huntingdon Co.: Morganroth, 01  
 Chalfont fault, Bucks Co.: Lyman, 95c  
 Chestnut Ridge disturbance: Gardner (J H), 15  
 Clay veins in coal beds: Gresley, 98  
 Coal apples: Gresley, 93  
 Collapsing crater, Pottstown: Goldsmith, 00  
 Connellsville quadrangle: Campbell (M R), 03  
 Crumpling of earth's crust: Claypole, 84l  
 Ebensburg quadrangle: Butts, 05b  
 Erosion, Center Co.: Ewing, 85  
 Exfoliation of rocks near Gettysburg: Frazer, 75g

## Pennsylvania—Continued.

*Physical geology*—Continued.

- Faulting in central Pa.: Ashley, 06e  
 Ferruginised tree, Montgomery Co.: Carter (O C S), 96  
 Fault, Triassic, Yardleyville: Lewis (H C), 82e  
 Faulting, Hollidaysburg quadrangle: Butts, 16b; South Mountain: Stose, 15  
 Folding: Margerie, 87  
 Folding and faulting, middle Pa.: Lesley, 74b  
 Geyser well, Kane: Ashburner, 79c  
 Hartman's Cave, Monroe Co.: Darton, 85a  
 "Indiana anticline": Richardson (G B), 02  
 Intraformational structure in Ordovician limestone: Field, 17  
 Kittanning quadrangle: Butts, 04  
 Latrobe quadrangle: Campbell (M R), 04  
 Masontown quadrangle: Campbell (M R), 02a  
 Mechanics of Allegheny structure: Ashley, 08  
 Metamorphism, New Hope: Rogers (H D), 48  
 Mountain structure: Chittenden, 97  
 Mountains: Claypole, 85b  
 Oolite, Bethlehem: Wherry, 15a; siliceous, origin: Moore (E S), 12; Wieland, 97b  
 Overtaken folds: Rogers, 41c  
 Paleozoic sediments, origin, Center Co.: Brown (T C), 13a  
 Peat, coal-like transformation, Scranton: Fairchild, 82  
 Peridotite dike, Fayette and Green Cos.: Smith (L B), 12  
 Perry Co. fault: Claypole, 84a  
 Pittsburgh coal bed: Wasmuth, 88  
 Pothole, Archbald: Dana (J D), 87e; Scranton: Eaton (H N), 16  
 Pressure fluxion: Lewis (H C), 86c  
 Punxsutawney, Curwensville, Houtzdale, Barnesboro, and Patton quadrangles, geologic structure: Ashley, 13  
 Quartz veins, origin: Frazer, 76c  
 Rural Valley quadrangle: Butts, 05a  
 Sandstone, origin: Claypole, 88g  
 Siliceous oolites, origin: Moore (E S), 12; Wieland, 97b  
 Slickensides, Luzerne Co.: Lyman, 66  
 South Mountain: Frazer, 84a  
 Stratification in gneiss, Philadelphia: Rand, 80e  
 Subterranean temperature, Pittsburgh: Hallock, 97  
 Sun-crack structure, Triassic diabase: Wherry, 12c  
 Susquehanna River, erosion: Mathews, 17  
 Southeastern Pa., structure: Lesley, 75d  
 Temperature in deep wells: Van Orstrand, 18  
 Trap dike, Lancaster Co.: Frazer, 78a; southeastern Pa.: Frazer, 84e; Lewis (H C), 85  
 Uniontown quadrangle: Campbell (M R), 02a  
 Weathering, Gettysburg: Frazer, 75b; of Pottsville conglomerate: Winslow, 84  
 Wilcox well, McKean Co.: Ashburner, 78b  
 Yardley fault, Bucks Co.: Lyman, 95b
- Physiographic geology.*  
 Appalachian drainage: Davis (W M), 92a  
 Armstrong Co., buried river channel: Lesley, 80c  
 Barnesboro quadrangle: Campbell (M R), 13a  
 Beaver quadrangle: Woolsey, 05



## Pennsylvania—Continued.

*Physiographic geology*—Continued.

- Beaver River, former flow: Hice, 03  
 Beaver terraces: King (A T), 54  
 Blair Co., Brush Mountain: Lesley, 73  
 Brownsville quadrangle: Campbell (M R), 03  
 Buck Co., stream piracy: Ward (R D), 92  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Buried river channels: Kemp, 15b  
 Buried valley, Susquehanna River, Luzerne Co.: Darton, 13a  
 Claysville quadrangle: Munn, 12  
 Coatesville quadrangle: Bliss (E F), 14  
 Connellsville quadrangle: Campbell (M R), 03  
 Deeps of Susquehanna River: Mathews, 17  
 Delaware Water Gap: Walter, 95; origin: Stose, 16a  
 Drainage changes: Hice, 12; Ortman, 12  
 Drainage evolution: Fairchild, 09d  
 Drainage features, upper Ohio region: Chamberlin (T C), 94e  
 Drift, Lycoming Co.: Meyer (A), 82  
 Northampton Co.: Prime, 79a  
 southern limit: Cook (G H), 79a  
 Susquehanna Valley: Bashore, 89  
 Ebensburg quadrangle: Butts, 05b  
 Elders Ridge quadrangle: Stone (R W), 05a  
 Elkland quadrangle: Fuller, 03a  
 Extramoraine fringe, age: Williams (E H), 94a  
 Extramorainic drift: Williams (E H), 94; Wright (G F), 93g  
 Extramorainic pebbles, western Pa.: Woolsey, 04a  
 Foxburg and Clarion quadrangles: Shaw (E W), 11e  
 Gaines quadrangle: Fuller, 03  
 General: Chittenden, 97; Rogers (H D), 49  
 Glacial, Ohio basin: Leverett, 02; western Pa.: Wright (G F), 94c  
 Glacial blocks, west Philadelphia: Lesley, 76c  
 Glacial border, recent date: Wright (G F), 13  
 Glacial dam in Allegheny River: Wright (G F), 14a  
 Glacial deposits, Chenango Valley: Brigham, 97; Philadelphia: Hall (C E), 76a  
 Glacial gravels, Susquehanna Valley: Bashore, 96  
 Glacial grooves: Foshay, 91  
 Glacial map, Pocono Mountain Plateau: Lesley, 82  
 Glacial striae, Northampton Co.: Rau, 97; Shawnee Mountain: Corss, 09  
 Glacial striae, supposed, Locust Mountain: Lewis (H C), 83l  
 Glaciation: Lewis (H C), 83a; Rogers (H D), 42a; Williams (E H), 97  
 Beaver Valley: Foshay, 90a  
 first phase: Williams (E H), 17  
 Kittanning quadrangle: Leverett, 04  
 Kittatinny or Blue Mountain: Hall (C E), 76  
 Lackawanna-Wyoming region: Branner, 87, 87a  
 Lehigh region: Williams (E H jr), 93a  
 northeastern Pa.: Branner, 86b  
 Pocono Knob: Kummel, 96

## Pennsylvania—Continued.

*Physiographic geology*—Continued.

- Glaciation: South Mountain: Frazer, 76f, Williams (E H), 93  
 southern limit: Wright (G F), 82a  
 western Pa.: Wright (G F), 94  
 Wyoming and Lackawanna valleys: Branner, 86  
 Glaciation (supposed) south of terminal moraine: Lewis (H C), 84a  
 Ice limit, eastern Pa.: Williams (E H), 95  
 Indiana quadrangle: Richardson (G B), 04a  
 Kansan drift: Williams (E H), 96b, 98, 02  
 Kansan glacial border: Williams (E H), 96a  
 Kittanning quadrangle: Butts, 04  
 Lakes and valleys, northeastern Pa.: Davis (W M), 83e  
 Latrobe quadrangle: Campbell (M R), 04  
 Lehigh Co.: Miller (B L), 14  
 Lehigh district: Peck, 11  
 Marginal Kames: Lewis (H C), 85b  
 Masontown quadrangle: Campbell (M R), 02a  
 Mercersburg-Chambersburg region: Stose, 04a, 09  
 Mifflin Co., Kishacoquillas Valley: Taylor (R G), 35a  
 Mountains: Claypole, 85b  
 Newport Creek buried valley: Ashburner, 86f  
 Northern Pa.: Campbell (M R), 03a; Williams (E H), 02  
 Patton quadrangle: Campbell (M R), 13a  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Philadelphia area: Bascom, 97  
 Philadelphia brick clay, age: Salisbury, 96d; Wright (G F), 96c  
 Philadelphia gravel, age: Wright (G F), 89b  
 Preglacial drainage of western Pa.: Hice, 09  
 Presque Isle, Lake Erie, glacial origin: Ingersoll, 85  
 Quaker Lake, Susquehanna Co.: Wilson (J H), 14  
 Quaternary deposits, Wyoming Valley: Darton, 14  
 River pirate, Deer Run: Davis (W M), 89g  
 Rivers and valleys: Davis (W M), 89f  
 Rural Valley quadrangle: Butts, 05a  
 Sewickley quadrangle: Munn, 11  
 Southwestern Pa.: Stevenson, 78b; Stone (R W), 08e  
 Surface formations, Philadelphia: Blodget, 76; Lewis (H C), 80e; southwestern Pa.: Stevenson, 78b, 80  
 Susquehanna region: Davis (W M), 96c; Hollister (G B), 04  
 Terminal moraine: Lewis (H C), 83a, d, e, 84; Lewis (J F), 92; Wahnschaffe, 92; Wright (G F), 82  
 Terrace levels: Lesley, 78c  
 Terraces, Harrisburg: Bashore, 94  
 Monongahela River: White (I C), 96  
 Ohio and Beaver rivers: Hice, 95  
 Terraces and abandoned valleys in western Pa.: Shaw (E W), 11  
 Tioga quadrangle: Fuller, 03a  
 Uniontown quadrangle: Campbell (M R), 02a  
 Western Pa.: Leverett, 91; preglacial drainage: Foshay, 90  
 Wind Gap, origin: Wright (F B), 96



## Pennsylvania—Continued.

*Physiographic geology*—Continued.

Wyoming, buried valley: Corss, 04; Griffith, 01; Hill (F A), 86; Lyman, 02a; and potholes: Corss, 00a

*Underground water.*

Artesian wells: Carter (O C S), 93a

Chambersburg and Mercersburg quadrangles: Stese, 05

Elders Ridge quadrangle: Stone (R W), 05d

Flowing wells on antilines: Clapp (F G), 10d

General: Fuller, 05g

Geyser well, Kane: Ashburner, 79c

Lehigh Co.: Clark (E), 75

Pawpaw and Hancock quadrangles: Stose, 05a

Philadelphia district: Bascom, 04, 09a; Carter (O C S), 93; Darton, 96d

Waynesburg quadrangle: Stone, 05e

West-central Pa.: Clapp (F G), 05a

Pennsylvanian. *See* Carboniferous.

Penn Yan quadrangle, N. Y.: Luther, 06a

Penobscot Bay folio, Me. (no. 149): Smith (G O), 07d

Penokee series: Irving, 92

Penokee-Gogebic district: Van Hise, 01

Pensauken (?) formation, Washington, D. C.: McGee, 00b

Pentremites. *See* Blastoidea.

Peoria quadrangle, Ill.: Udden, 12

Peorian soil: Leverett, 98c

Percé: Clarke (J M), 05a

Percival, J. G., biography: Pettee, 91; Ward (J H), 66

Peridotite. *See* Arkansas and Kentucky.

Peridotite dikes, Ithaca, N. Y.: Kemp, 91d

Periodic diastrophism, production of: Chamberlin (T C), 13, 13b

Periodic migrations: Smith (J P), 04

Perissodactyla. *See* Mammalia.

Permian. *See* Carboniferous.

Permian glaciation: Huntington, 14a

Permian moraine, Prince Edward Island: Bain (F), 87

Permian series: LaForge, 12

Perry township, Ohio: Carney, 06

Perry Park syncline, Colo.: Kruger, 10

Petrifaction of bones: Goldsmith, 98a

Petrifactions, replacement of: Rogers (A F), 10

Petrified forests.

Arizona: Carter (O C S), 04; Kunz, 86b; Merrill (G P), 13c; Ward (L F), 00a, d; Williams (F E), 13

Montana, Gallatin Mountains: Knowlton, 14c

Tertiary, California: Marsh, 71a

Yellowstone National Park: Holmes (W H), 79; Weed, 92a

Petrogenesis: Daly (R A), 13b

Petrographic analysis: Derr, 03

Petroleum. *See also* names of petroleum-producing States, etc., and Oil shale.

Accumulation: Adams (G I), 03b; Burroughs, 11a; Clapp (F G), 10, 11e; Daly (M R), 17; Hayes, 02d; Hutchison, 11; Johnson (R H), 10, 11, 12; Lauer, 17; Lewis (J O), 18; Munn, 10, 13; Orton, 88a

Appalachian region: Munn, 12f

conditions of: Day (D T), 10a

diastrophic theory: Daly (M R), 16

## Petroleum—Continued.

Accumulation: Mexico: Villarello, 10b

mode of accumulation: Griswold, 02

oil in salt domes: Jones (W F), 18b

near outcrop: Pepperberg, 15a

Algae of petroleum-yielding shales of Green River formation: Davis (C A), 16

Anticlinal and hydraulic theories of accumulation: Munn, 09, 09a

Anticlinal theory of accumulation: Clapp (F G), 09a; Höfer, 10a; White (I C), 86, 17

Oklahoma evidence on: Hager, 17

origination of: Taylor (F H), 11

Appalachian and Central States: Ashley, 12

Appalachian geosyncline, deep sand possibilities, West Virginia: Reger, 16

Appalachian oil field: Fuller, 17

brines: Richardson (G B), 17a

dry sands: Reeves, 17; Shaw (E W), 17f

Association with faults and dikes: Clapp (F G), 12a

Berea sand, Ohio, lithology: Panyity, 18

Bibliography, 1915: Burroughs, 18

Bituminous matter in black shales: Orton, 82

Brines of oil fields, origin: Reeves, 17a

Capillarity, effects on oil accumulation: McCoy, 16; Washburne, 17

Capillary concentration: Washburne, 14b 15

Classification of fields based on structure: Clapp (F G), 10a

Composition: Mabery, 97, 02, 03; relation to genesis and occurrence: Mabery, 16

Conditions of occurrence: Surr, 10b

Connate water in oil and gas sands: Johnson (R H), 15; Shaw (E W), 15a; Washburne, 15a

Conservation: Arnold, 16

Dakota sand, oil, gas and water content: Huntley, 15a

Diastrophic theory of oil and gas accumulation: Daly (M R), 16

Differential cementing: Johnson (R H), 12a

Diffusion of sodium chloride in Appalachian oil-field waters: Richardson (G B), 17b

Diffusion through fuller's earth: Day (D T), 03; Gilpin (J E), 11

Dip of marine limestone strata: Mather, 18

Distribution: Day (D T), 11

Dome theory: Harris 12a; Lucas (A F), 12a

Estimation of reserves: Pack, 17

Ethics of petroleum geologist: Clapp (F G), 17a

Formation and accumulation: Dumble, 14

Fossil wood, relationship to oil: Stuart, 14

General: Arnold, 17, 17a; Bacon, 16; Baxter, 05; Bone, 65; Brann, 95; Broadhead, 77; Burton, 18; Carll, 87; Clapp (F G), 10, 14; Day (D T), 08, 14a; Erni, 65; Evans (E W), 64; Fernández, 71a; Gesner, 61, 62; Gilbert (C E), 18a; Gorby, 89a; Griswold, 06a; Hager, 16; Henry, 73; Hunt, 61, 63, 67c; Johnson (R H), 16; Kilham, 03; Leeds, 65; Lesley, 86f; Lesquereux, 75; Matteson, 17a; Mayer, 17; Millern, 64; Murray, 64; Newberry, 59, 90c; Northrop, 16b; O'Harra, 18; Oliphant, 97; Orton, 98; Peckham, 84; Requa, 16; Rogers (H D), 66; Shaler, 79; Stowell, 83; Sur, 14; Topley, 92; Walker (G T), 15; Weeks, 87; Wheeler, (H A), 09; Wilson (L M), 16; Wrigley, 75; Ziegler, 18b



## Petroleum--Continued.

- Geologic deposition of hydrocarbons: Adams (G I), 03b  
 Geologic distribution: Hitchcock (C H), 67  
 Geologic occurrence: Anderson (R), 12b  
 Geologic relations and distribution: Andrews (E B), 61, 66  
 Geology: Allen (M A), 18; Clapp (F G), 16; O'Harra, 18; Ziegler, 18  
     relation to oil industry: McDowell, 17  
     value in petroleum industry: Hager, 11; Knapp (I N), 12  
 Geothermic gradients, relation to: Shaw (E W), 12a  
 Gravity anomalies in locating salt domes: Shaw (E W), 17e  
 Gravity variation due to sulphur: Rogers (G S), 17c  
 Gulf coastal region: Hager, 04; Lucas (A F), 18; McBeth (R S), 18  
 Historical: Kilham, 03  
 Intrusions, relation to origin, Mexico: Garfias, 12, 17  
 Isotherm hypothesis of origin: Plotts, 05, 11, 16  
 Land classification: Smith (G O), 13  
 Literature: Breger, 12a; recent: Bain, 08b  
 Magnetic declination lines: Tarr (W A), 12  
 Magnetic disturbances and the genesis of petroleum: Becker, 09  
 Map, United States: Day (D T), 14b; of productive fields, 1908: Day (D T), 09b  
 Marking oil maps: Johnson (R H), 10a  
 Migration: Ziegler, 18a  
 Migration and separation of hydrocarbons, relation to structure: Turnbull, 16b  
 Migration through sedimentary rocks: McCoy, 18  
 Monoclinical dips: Clapp (F G), 11e  
 Movement through rocks: Washburn, 18; Ziegler, 18a  
 North America: Burkart, 70  
 Occurrence: Hager, 11; in cavities of fossils: Phillips (F C), 97a; in monoclinical structure: Clapp (F G), 11g  
     mode of: Clapp (F G), 09b; with reference to structure: Washburne, 11b  
 Occurrence and quality, relation to uplift and folding: Shaw (E W), 18g  
 Occurrence and source: Haworth, 08  
 Oil in argillaceous rock: Udden, 15c  
 Oil field, type report on: Kite, 17  
 Oil-field structure, graphic representation: Heindl, 12  
 Oil-field temperatures: DeGolyer, 18a  
 Oil-field waters: Rogers (G S), 16; chlorides in: Washburne, 14a  
 Oil fields, origin: van der Gracht, 18  
 Oil prospects under Lake Erie: Nattress, 17  
 Oil reserves, estimation: Washburne, 15  
 Oil-bearing and oil-producing formations: Grabau, 18  
 Oil-bearing Paleozoic formations: Grabau, 17f  
 Oil-bearing rocks, accumulation: Branner, 13a

## Petroleum--Continued.

- Origin: Am G, 89c; Anderson (R), 12b; Blatchley (R S), 11, 12; Chautard, 13; Clapp (F G), 14; Coste, 09, 09a, 12, 14, 18; Dalton, 09; Day (D T), 97; Forstall, 92; Grant (C C), 03a; Hayes, 03a; Höfer, 10b, 14; Hubbard (L L), 95; Hunt, 61, 66d; Hutchison, 11; Johnson (R H), 11; Latimer, 12; Munn, 10; Newberry, 76d, 82, 88f, 1, 89a; Ohly, 02; Orton, 88a, 89, 90, 91, 98; Peckham, 84, 97, 98; Phillips (F C), 97; Plotts, 05, 11, 16; Prutzman, 10a; Richardson (C), 16, 17; Rogers (H D), 60; Ross, 92; Sadtler, 97; Steidtmann, 18; White (D), 15a, c, 17; White (I C), 82d, 92, 04; Zuber, 10  
 California: Cooper (A S), 93, 99, 01; Edwards (A M), 08  
 Mexico: Ordóñez, 14  
 Oklahoma, Healdton field: Wegemann, 15b  
 theories of: Breger, 11b; historical review: Campbell (M R), 11a  
 Origin and accumulation: Wilson (L M), 16  
 Origin and occurrence: Carll, 80  
 Paraffin dirt, Gulf coast oil fields: Brokaw, 18  
 Petrology of reservoir rocks: Lauer, 17; Lewis (J O), 18; Rogers (G S), 18  
 Pools, origin: Steidtmann, 18  
 Porosity of oil sands: Shaw (E W), 18c  
 Porosity of rocks, relation to accumulation: Jones (W F), 18a  
 Practical value of oil and gas bureaus: Matteson, 17a  
 Prospecting: Allen (M A), 17  
 Quality and deformation, relation: Johnson (R H), 15a  
 Quaquaversal structure: Clapp (F G), 12  
 Rock disturbances theory: Coste, 14  
 Rock pressure, cause: Shaw (E W), 17d  
 Rôle of geology in discovery of: Ziegler, 17d  
 Salt domes, origin: Dumble, 18b  
 Salt water, relation to oil accumulation: Johnson (R H), 18  
 Source and origin of salt-dome oil: Lucas (A F), 18  
 Southwest: Phillips (W B), 14a  
 Structural classification of petroleum fields: Clapp (F G), 17  
 Submarine deposits: Urbina, 18  
 Trenton limestone: Blatchley (W S), 03b  
 United States: Arnold, 15; Boyd (E F), 76; Day (D T), 09; Hager, 18b; Höfer, 77; Otsuka, 03; Richardson (C), 06; Shaw (E W), 17a; U S G S, 83; Vicaire, 07  
 Volcanic origin: Coste, 04, 04a  
 Water surfaces in oil fields: Daly (M B), 18  
 Western oil fields: Willey, 05  
 Petrology (general). *See also* Igneous and volcanic rocks; Technique. *For regional see names of States.*  
 Absarokite-shoshonite-banakitite series: Iddings, 95  
 Absorption capacity of rocks: Hill (R T), 91e  
 Abstracts and reviews: Johannsen, 17b  
 Alaskaitite: Koenig, 81  
 Alkaline rocks, genesis: Daly (R A), 10a, 18  
 Allanite and epidote in rocks: Hobbs, 89



## Petrology—Continued.

- Allanite in rocks: Iddings, 85a  
 Alnoite, Manheim, N. Y.: Smyth (C H), 98  
 Alteration of rocks: Steidtmann, 08  
 Amphibole and pyroxene minerals: Cross, 90  
 Amphiboles: Lane, 94b  
 Analyses of rocks: Clarke (F W), 97, 00b, 04, 10a, 15; Washington, 17  
   re-calculation: Kemp, 00b  
   statement: Washington, 00c  
 Analysis of rocks: Boricky, 92; Connor, 13; Egleston, 74; Washington, 04, 10; of silicate and carbonate rocks: Hillebrand, 07, 10  
 Angles of crystals in sections: Lane, 91  
 Anhedron: Pirsson, 96a  
 Anorthosite: Kolderup, 03  
 Anorthosites, origin: Bowen (N L), 17a  
 Archean greenstones, origin: Winchell (N H), 95d  
 Arkose, formation: McGee, 96e  
 Augite andesite and related ultra-basic rocks, origin: Daly (R A), 08  
 Augite in peridotite, enlargement of: Merrill (G P), 88a  
 Australites: Moore (E S), 16  
 Average analyses in defining igneous rocks: Mathews, 17a  
 Average igneous rock: Mead (W J), 14  
 Baked shale and slag formed by burning of coal beds: Rogers (G S), 17  
 Barium in rocks, determination of: Langley, 08  
 Basic rock from granite: Smyth (C H), 94a  
 Bleaching of granite at limestone contacts: Cushing, 10  
 Brucite, determination of: Julien, 06a  
 Brun's new data on volcanism: Winchell (A N), 12  
 Calcium orthosilicate in norm of igneous rocks: Washington, 15a  
 Calculation of norm in igneous rocks: Finlay (G I), 10  
 Chemical analysis of rocks, manual of: Washington, 04, 10  
 Chemical composition as a criterion in identifying metamorphosed sediments: Bastin, 09, 13  
 Chert, origin: Davis (E F), 18a  
 Classification of rocks: Bonney, 79; Grabau, 03e, 04c; Iddings, 98; Wadsworth, 79, 84  
   geological *versus* petrographical: Cross, 98  
   igneous rocks: Adams (F D), 91a; Bayley, 93c; Cross, 02b, 10a, 12d, 14b; Turner, 98f; Waitz, 09; Wicks, 10  
   massive rocks: Bayley, 88b  
   on three coordinates: Winchell (A N), 13  
   original rocks: Macfarlane, 80  
 Clay stone, genesis: Nichols, 97  
 Collecting rocks: Merrill (G P), 95a  
 Common minerals and rocks: George (R D), 17  
 Complementary rocks and radial dikes: Pirsson, 95  
 Components of rocks, relative volumes: Lincoln, 13a  
 Composition, general: Hobbs, 13  
 Compressibility and plastic deformation of certain rocks: Adams (F D), 06

## Petrology—Continued.

- Contact phenomena; Calderón, 07  
 Continental clastics, characteristics: Blackwelder, 17a  
 Conversion of rock analysis: Mead (W J), 12  
 Coral limestones, structure: Hill (W), 91  
 Correlation of potassium and magnesium, sodium and iron in igneous rocks: Washington, 15  
 Crystalline rocks: Hunt, 85c; Winchell (N H), 85g, 94b  
   bibliography: Winchell (N H), 89c  
   formation: Daubrée, 59  
   northern California and southern Oregon: Dutton, 91  
   origin: Hunt, 62c, 71a, 72c, 84a, 85, 87a  
   origin and classification: Macfarlane, 70  
   structure and origin: Winchell (N H), 93a  
 Crystalline schists: Hunt, 88; Powell, 91b  
   Coast Ranges: Becker, 91c  
   Lake Superior district: Irving, 91  
   origin: Redway, 94; Williams (G H), 85f  
 Crystalline stratified rocks: Hunt, 77c  
 Crystallization, order in igneous rocks: Bowen (N L), 12b; spherulitic: Iddings, 91b  
 Crystallized slags from copper smelting: Lane, 95b  
 Crystalloblastic order in metamorphism: Lahce, 14a  
 Deformation of rocks: Adams (F D), 10a  
 Determination of common minerals and rocks, tables for: Tarr (W A), 14  
 Determination of minerals, tables: Crosby, 87; Eakle, 04; Egleston, 67; Foye, 75; Frazer, 01; Luquer, 98; Tarr (W A), 14  
 Determination of minerals by birefringence: Pirsson, 00a  
 Determination of minerals in rocks: Boricky, 92; Hussak, 86  
 Determination of rocks: Hobbs, 14; tables: Bowles, 10  
 Diabase, plumose: Emerson, 03a  
 Diagrams for chemical composition: Iddings, 03a  
 Differentiation of a secondary magma through gravitative adjustment: Daly (R A), 06  
 Diorite produced by metamorphism: Keith, 13a  
 Distribution of elements in igneous rocks: Washington, 08a  
 Dolerites, iron in: Hawes, 77  
 Dolomite, formation of: Skeats, 18  
 Drawing board for stereographic projection: Johannsen, 11a  
 Educational series of rock specimens: Diller, 98a  
 Effusive and intrusive in the quantitative classification: Lane, 14a  
 Elementary textbook: Rutley, 79  
 Ellipsoidal structure, Lake Superior region: Clements, 02  
 Eocene formations, Rocky Mountains, petrographic characters: Johannsen, 14a  
 Enlargement of minerals: Irving, 94  
 Epidote in eruptive rocks: Keyes, 93c  
 Eruptive and primary rocks, origin: Macfarlane, 63  
 Euphodite and saussurite: Hunt, 59  
 Eutectics in rock magmas: Lane, 04  
 Evolution of petrological ideas: Teall, 03



## Petrology—Continued.

- Feldspar in Keweenawan sandstones: Van Hise, 84  
 Feldspars, determination: Winchell (N H), 98  
 Feldspars, lenads, and zeolites: Washington, 13a  
 Feldspars, perthitic, quantitative study: Warren (C H), 15  
 Feldspathic granulites, nomenclature: Turner, 00b  
 Felspathic rocks: Hunt, 571  
 Fissure inclusions in fibrolitic gneiss, New Rochelle, N. Y.: Julien, 79a  
 Flow of rocks: Adams (F D), 97b, 11a, 12b  
 Foliated crystalline rocks: Trueman, 12  
 Formation of rocks: Maclure, 18a  
 Fortieth parallel: Merrill (N F), 82; Wadsworth, 82a, 84a; Zirkel, 83  
 Fractional crystallization of rocks: Becker, 97b  
 Fundamental principles: Weinschenk, 16  
 General: Bayley, 86, 15; Clarke (F W), 15; Crosby, 92; Dana (J D), 72a, 78b; Diller, 98a; Harker, 11; Hunt, 64, 72b; Iddings, 96b, 14; Irving, 83; Kemp, 95a; Merrill (G P), 97, 06; Palache, 12a; Ransome, 02; Sosman, 11; Tillman, 00; Wadsworth, 83d, 84; Watson (T L), 12c; Williams (G H), 85d, 86a; Zirkel, 04  
 Genetic relationships, igneous rocks: Iddings, 93a  
 Glass-making processes: Bowen (N L), 18  
 Glaucophane schists: Washington, 01a  
 Gneiss, origin: Bell (R), 90b; Cross, 96a; Meunier, 15a  
     origin and classification: Gordon (C H), 01  
     secondary banding in: Hobbs, 92  
 Grain in igneous rocks, variation: Queneau, 02  
 Grain of igneous intrusives: Lane, 03c  
 Grain of rocks: Lane, 95c, 97b, 05d, 06a, 12e  
 Granite, character: Watson, 10a  
     origin: Callaway, 94; Lane, 13a  
     secondary origin: Daly (R A), 05d  
     variolitic, Craftsbury: Kroustschoff, 85  
 Granitic rocks: Hunt, 71b  
     concentric structure: Shaler, 69  
     northwestern States: Hall (C W), 95a  
 Granodiorite: Lindgren, 00b  
 Graphical methods in microscopical petrography: Wright (F E), 13d  
 Graphical plot for plagioclase feldspars: Wright (F E), 13e  
 Great Basin, volcanic rocks: Hague, 84  
 Handbook of rocks: Kemp, 96  
 Hemidiorite: Dana (J D), 83c  
 History: Pirsson, 18  
 Holocrystalline granitic structure: Williams (G H), 87c  
 Hornblende enlargements: Van Hise, 85  
 Hornblende in crystalline rocks: Irving, 83f, 84a  
 Hypersthene basalt: Williams (G H), 85b  
 Igneous rocks: Iddings, 09a  
     analyses: Washington, 03, 04a  
     average composition: Knopf, 16b  
     chemical composition expressed by diagrams: Iddings, 03  
     evolution stages: Bowen (N L), 15b

## Petrology—Continued.

- Index-ellipsoid in petrographic-microscopic work: Wright (F E), 13a  
 Intergrowths of hornblende with augite: Hobbs, 92d  
 Itacolumite: Shepard, 45a  
 Keweenawan igneous rocks, nomenclature: Winchell (A N), 08  
 Keweenawan sandstones: Van Hise, 84  
 Kulaite, composition: Washington, 00a  
 Lake Superior region: Irving, 83f, 85a; Williams (G H), 93c  
     basic massive rocks: Bayley, 93a  
     classification and nomenclature: Winchell (A N), 08  
 Laurentian limestones, mineralogy: Hunt, 67i  
 Lava, origin: Hobbs, 12a  
 Lava maculae: Hobbs, 13  
 Leucite in igneous rocks: Washington, 07  
 Limestones, crystalline, mineralogy: Hunt, 67h; Jamaica, structure: Hill (W), 91a  
 Lithogenesis: Grabau, 17b; of sediments: Van Tuyl, 16h  
 Lithological nomenclature: Chamberlin (T C), 82a  
 Lopolith: Grout, 18a  
 Magmatic alteration of hornblende and biotite: Washington, 96  
 Magmatic differentiation, influence of varying degrees of superfusion in: Lane, 06b  
 Magnesian rocks: Hunt, 60, 67g; origin: Hunt, 57k, 59c, 61c  
 Magnetic rocks: Harris, 09a  
 Manual of petrographic methods: Johannsen, 14  
 Marble, flow of: Adams (F D), 10e  
 Marine clastics, diagnostic characteristics: Kindle, 17c  
 Methods of petrographic-microscopic research: Wright (F E), 11; of petrography: Williams (G H), 85g  
 Mexico, origin of certain rocks: Bárcena, 82  
 Microscope: Williams (G H), 88; Winchell (N H), 89d; Wright (F E), 17a; improvements: Wright (F E), 11a; use in petrography: Hobbs, 88b  
 Microscopic methods: Wright (F E), 04  
 Microscopic petrography: Wadsworth, 13; quantitative: Wright (F E), 12, 13  
 Microscopic physiography of massive rocks: Rosenbusch, 88  
 Microstructure of ore from Frisco mine, Idaho: Campbell (W), 09  
 Mineragraphy, technique: Whitehead, 17  
 Mineral relations from laboratory viewpoint: Day (A L), 10  
 Minerals in rock sections, optical determination: Luquer, 97, 98  
 Minerals of trap, origin: Dana (J D), 45a  
 Moldavites: Wright (F E), 15  
 Monazite in rocks: Derby, 89  
 Monchiquites: Pirsson, 96  
 Montana petrographic province: Pirsson, 05a  
 Multiple rock diagrams: Grout, 18d  
 Names of rocks: Hunt, 62  
 Neponsetose: Bascom, 16  
 Nineteenth century development: Cross, 02a



## Petrology—Continued.

- Nomenclature: Bayley, 93e; Butler (G M), 15a; Cross, 02b, 03, 10a, 12d, 14b; Van Hise, 99a; of crystalline rocks: Jackson (A W), 82
- Norite or labradorite rock: Hunt, 70b
- Norites and gabbros: Herrick, 88
- Novaculites, origin: Branner, 98b
- Oblique illumination in microscopic work: Wright (F E), 13
- Obsidian, Yellowstone National Park: Iddings, 88
- Occlusions of igneous rock: Julien, 04a, 06
- Ocular for petrographic microscope: Wright (F E), 10a
- Oolite, siliceous, structure: Hovey, 94b
- Optical determination of minerals: Luquer, 02
- Ophitic and related terms: Winchell (A N), 10
- Ophitic texture: Lane, 07e, 08e, 10e
- Orthoclase as a gangue mineral: Lindgren, 98b
- Pegmatites, origin: Crosby, 94c, 97b; Hastings, 08a; Julien, 01b
- Pele's tears: Moore (E S), 16
- Peridotite, origin: Lewis (J V), 95
- Perknites: Turner, 01
- Petrogenesis: Daly (R A), 13b
- Petrographic analysis: Dorr, 03
- Petrographic collection of American rocks: Clark (R W), 16
- Petrographic description: Berkey, 13, 13d
- Petrographic microscope: Wright (F E), 10  
combination wedge: Wright (F E), 02  
improvements for: Johannsen, 10  
use of: Wadsworth, 93
- Petrographic nomenclature: Hobbs, 06b
- Petrographic province, chemical relations, representation: Adams (F D), 14
- Petrographic provinces: Iddings, 14a
- Petrographic reports: Tomlinson, 14
- Petrographical tables: Lane, 91b
- Petrography, relations to other sciences: Zirkel, 04
- Petrological abstracts and reviews: Johannsen, 10a
- Petrosiliceous rocks, origin: Crosby, 79b
- Phenoerysts, origin: Crosby, 00e; in granites of Georgia: Watson, 01a
- Piedmont Plateau, granitic rocks: Williams (G H), 95
- Plagioclase feldspars, determination: Becker, 98a
- Poikilitic and micropoikilitic: Williams (G H), 93d
- Polarizer in petrographic microscope: Wright (F E), 15b
- Porphyritic appearance: Lane, 03d
- Porphyritic quartz in eruptive rocks: Diller, 89b
- Porphyry: Rickard, 95a; origin: Bouvé, 76
- Pressure in formation of rocks and minerals: Johnston (J), 15
- Pre-Tertiary nepheline-bearing rock: Bascom, 96a
- Problems in petrology: Iddings, 11
- Progress in 1887 and 1888: Merrill, (G P), 90a
- Propylite: Wadsworth, 84f

## Petrology—Continued.

- Pyroxene, alteration to hornblende: Gordon (C H), 04a; Williams (G H), 84
- Pyroxene in augitic rocks: Cross, 83
- Quantitative classification of igneous rocks: Cross, 03, 15a; Mathews, 03a  
center points: Washington, 03b  
modifications: Cross, 12b
- Quantitative microscopic petrography: Wright (F E), 13
- Quantitative mineralogical classification of gradational rocks: Lineoln, 13
- Quantitative physico-chemical investigations: Day (A L), 12
- Quartz in basalt, origin: Iddings, 88a
- Quartz rocks, origin: Blake (J F), 94
- Quartzite, classification and origin: Cayeux, 07
- Recording micrometer for geometrical rock analysis: Shand, 16
- Riebeckite rocks: Murgoci, 05, 06
- Rock analysis, methods: Hillebrand, 00b
- Rock-making minerals, table of index of refraction and birefringence: Hotchkiss, 08
- Rocks, crystalline and sedimentary, chemical equivalence: Gilbert, 94b
- Rocks and rock minerals: Pirsson, 08
- Rock minerals, determination: Iddings, 06; Johannsen, 08
- Rocks, average composition: Clarke (F W), 12
- Rocks for road building: Lord, 07
- Rutile-bearing rocks: Watson (T L), 12d
- Scapolite, primary, in igneous rocks: Calkins, 09b
- Scapolite rocks, Alaska: Spurr, 00c
- Schistosity by crystallization: Wright (F E), 06c
- Schists: Thelen, 05; crystalline: Powell, 91b
- Sectioning machinery: Williams (G H), 93b
- Sectioning rocks: Merrill (G P), 95a
- Sedimentary rocks: Rogers (G S), 13a; interpretation: Grabau, 17b
- Serpentine: Hunt, 83; Julien, 14  
alteration: Knopf, 06a  
eastern United States: Martin (D S), 74  
origin: Benson, 18
- Serpentine in fossiliferous rocks: Dawson (J W), 79h
- Serpentine rock: Hayes (A A), 56
- Silica, determination: Knight (N), 07
- Silicates: Clarke (F W), 90b  
classification: Hunt, 85b, 87  
constitution: Clarke (F W), 95, 14  
salic: Washington, 12
- Siliceous rocks, nomenclature: Griswold, 95b; origin: Hunt, 59e
- Sills and laccoliths: Daly (R A), 13b
- Slide rule in rock analyses: Hance, 15
- Solubility of chemical constituents of rocks: Smyth, 13
- Spheroidal granite: Kemp, 03e
- Spherulites: Cross, 91a; Wright (F E), 15
- Spherulitic crystallization: Iddings, 91b
- Stratification of rock masses: Hunt, 74b
- Study of rocks without microscope: Rogers (A F), 10c
- Sundry rocks: Kemp, 92e



## Petrology—Continued.

- Symbols in quantitative classification: Cross, 12a
- Synthesis of rocks, experimental studies: Sosman, 18
- Technique: Derby, 91a; Herrick, 85; Williams (G H), 86a; of rock sections: Hensoldt, 89; Luquer, 92
- Terminology: Elftman, 97
- Terms for field use: Johannsen, 11
- Ternary system; diopside, forsterite, silica: Bowen (N L), 14c
- Tertiary eruptive rocks, classification: Szabó, 79
- Texture, porphyritic: Crosby, 00c
- Texture of igneous rocks: Cross, 06a
- Textures and structures, classification: Crosby, 82
- Titanic oxide, distribution: Dunnington, 91
- Topaz and garnet in lithophyses of rhyolite: Cross, 86a
- Tourmaline rocks, origin: Patton, 99
- Treatise on rocks: Merrill (G P), 06
- Tridymite, production of, in volcanic rocks: Lacroix, 05b
- Tuffs, Soufrière, St. Vincent: Howe, 03
- United States-Mexico boundary: Lord, 99
- U. S. National Museum collection: Merrill (G P), 91a
- Volcanic rocks, natural system: Richthofen, 68
- Volcanic tuffs: Pirsson, 15a
- Volcanite: Hobbs, 94c
- Volume changes in metamorphism: Lindgren, 18b
- Xenotime in rocks: Derby, 91
- Zirkelite: Wadsworth, 98b
- Pettee, W. H., biography: Russell, 06
- Phaserule: Johnston (J), 13b; and igneous magmas: Day (A L), 05b, 06b; Read, 05
- Phenacodus: Osborn, 98d
- Phenocrysts: Pirsson, 99
- Philadelphia brick clay, age: Salisbury, 96d; Wright (G F), 96c
- Philadelphia folio, Pa.-N. J.-Del. (no. 162): Bascom, 09a
- Philipsburg folio, Mont. (no. 196): Calkins, 15
- Philipsburg quadrangle, Mont.: Emmons (W H), 07a, 13b
- Philosophy, etc. *See also* History.
- Century of geology: Le Conte, 00
- Classification of geologic phenomena: Keyes, 98b
- Critical periods in earth's history: Le Conte, 95
- Earth movements: Van Hise, 98b
- Earth sciences, methods: Chamberlin (T C), 04c; relations: Davis (W M), 04
- Fundamental problems of geology: Chamberlin (T C), 06a
- General: Dana (J D), 56b; McGee, 91d; Taylor (W B), 85a
- Geologic day: Lane, 06e
- Geological continuity: Nicholson, 72b
- Geology under the planetesimal hypothesis: Fairchild, 04c
- Geophysics, problems of: Becker, 06
- Glacial periods and their bearing on geological theories: Coleman, 08a
- Illogical geology: Price, 06

## Philosophy, etc.—Continued.

- Meteorites with reference to world-making: Merrill (G P), 09b
- Multiple working hypotheses: Chamberlin (T C), 97c
- Paleontological record, imperfection: Nicholson, 72c
- Paleontology and recapitulation theory: Cummings, 10
- Philosophy of geology and the order of the state: Clarke (J M), 17
- Pre-Cambrian geology and uniformitarianism: Coleman, 09d
- Problems of geology: Van Hise, 04a, 06
- Rhythms and geologic time: Gilbert, 00
- Speculative nature of geology: Davis (W M), 13d
- Phlogopite: Fritz-Gaertner, 79
- Phoenix, Boundary district, B. C.: LeRoy, 12
- Phosphate.
- Alabama: Smith (E A), 92b
- Alberta: Adams (F D), 17b; Banff district: De Schmid, 16a
- Canada: Coste, 88a; Hoffmann, 79; apatite: Ells, 04
- Coral rock, transformation to phosphate: Hughes (G), 85
- Cyclora in phosphate deposits: Miller (A M), 96
- Distribution: McCallie, 96
- Florida: Sellards, 08b; map: Fla G S, 13
- Formation of phosphatic concretions in deep-sea deposits: Davidson (W B M), 92a
- General: Adams (F D), 15a; Carnot, 96; Dawson (G M), 84b; Day (D T), 85b; Hovey, 04l; Penrose, 88; Phalen, 13a, 16, 16b; Sellards, 14b; Stone (R W), 17a; Stone (S R), 12; Van Horn (F B), 08; Wills, 92; Wyatt, 91
- Idaho: Bell (R N), 17; southeastern: Schultz, 18
- Kentucky, central: Phalen, 17
- Land classification: Smith (G O), 13
- Mexico, Nuevo León, Monterrey: Flores, 16, 16b
- Middle Tennessee: Safford, 94
- Minerals containing phosphoric acid: Phillips (W B), 93
- Montana, Garrison-Philipsburg fields: Pardee, 17; Philipsburg quadrangle: Calkins, 15
- Navassa: D'Invilliers, 91a
- Origin: Blackwelder, 15c; Kerr, 70a; McCallie, 96; Penrose, 88; Sellards, 14b; Shepard, 69a; Surr, 11
- phosphatic nodules: Matthew (W D), 93
- Rocky Mountain deposits: Blackwelder, 14b, 15c
- western phosphates: Mansfield (G R), 18
- Phosphate of lime, geologic origin: Davidson (W B M), 93
- Redonda: Hitchcock (C H), 91; Morse, 94
- South Carolina: Moses, 83; Packard (A S), 71; Shaler, 73
- Southern States: Brown (L P), 05; O'Neal, 98; Sellards, 14c
- Tennessee: Hayes, 01c; Phalen, 16a; Safford, 95
- Columbia quadrangle: Hayes, 03
- Johnson Co.: Jenkins, 16; Watkins, 15c
- United States: Brown (L P), 13; Mansfield (G R), 17; U S G S, 83; Van Horn (F B), 09, 11; Waggaman, 12a, 15



**Phosphate—Continued.**

- Utah; Uinta Mountains: Schultz, 18a
- Western deposits: Van Horn (F B), 11
- Western United States and Canada: Ferrier, 17
- Wyoming, Salt River Range: Mansfield, 16a; western: Schultz, 18
- Phosphorescent limestone: Lewis (H C), 84d
- Phosphorite, Hurdsville, N. J.; Alger, 50c
- Phosphorus.
  - Geologic rôle: Blackwelder, 16, 16a
  - Geologic transformation: Blackwelder, 16b
  - Pennsylvania, Mount Holly Springs: Stose, 07a
  - United States: U S G S, 83
- Photographs: Darton, 02d; Diller, 91a
- Phyllite, Montana: Rowe, 08
- Phyllocarida: Packard (A S), 82a
  - Ceratiocaris acuminata*, Waterlime, Buffalo, N. Y.: Stose, 94
  - Ceratiocaridae*, Pennsylvania: Beecher, 84
  - Cryptozoe problematicus*: Packard (A S), 86g
  - Wisconsin: Whitfield, 96a
- Phyllopoda, geologic succession: Packard (A S), 83
- Phylogenesis, relation to historical geology: White (C A), 05a
- Phylogeny of an acquired characteristic: Hyatt, 94
- Physical geology (general). *For regional, see names of States.*
  - Abstraction of oxygen from atmosphere by iron: Smyth (C H), 05
  - Accretion of flood plains by sand bars: Simpson (H E), 03
  - Arched structure in Lockport limestone: Fairchild, 08a
  - Arcuate mountains, formation: Hobbs, 14a
  - Age of a cooling globe in which the initial temperature increases directly as the distance from the surface: Becker (G F), 08
  - Animal agency in soil making: Shaler, 88d
  - Arctic sea ice: Tarr, 97j
  - Areas of continental progress: Dana (J D), 90a
  - Arid deflation, measurement: Keyes, 10k
  - Arid erosion, measurement: Keyes, 15m
  - Arroyo formation: Dodge (R E), 02a
  - Atlantic Coast, Tertiary dislocations: Shaler, 94f
  - Atmospheric agencies: Chamberlin (T C), 13c
  - Appalachian structure, mechanics of: Willis, 93b
  - Appalachians: Lebling, 14
  - Baked clays, Wyoming: Bastin, 05
  - Baked shale and slag formed by burning of coal beds: Rogers (G S), 17
  - Baking of clay beds: Allen (J A), 74
  - Banded structure in gold vein: Rolker, 86
  - Basin-range structure: Campbell (M R), 03e; Keyes, 05a
  - Basin ranges, origin and structure: Spurr, 01a
  - Basin region: Gilbert, 75
  - Beach and dune sands: Shaler, 94c
  - Beach structure in Medina sandstone: Fairchild, 01b
  - Bituminization of wood: Carpenter (W M), 39a
  - Blazing beach, Kittery Point, Maine: Penhalow, 05c
  - Blowing of soils: Reagan, 08b
  - Boring algae: Duerden, 02c
  - Boulders in gravel deposits: Rich, 14b

**Physical geology—Continued.**

- Breccia in St. Louis limestone, origin: Morse (W C), 16
- Burning of coal beds in place: Bowie, 14; Rogers (G S), 17
- Bysmaliths: Iddings, 98b
- Calcium carbonate: Merwin, 16; deposition, rôle of inorganic agencies: Johnston (J), 16, 16c
- Canyons and precipices, formation: Maefarlane, 84
- Carbon dioxide of ocean and atmosphere: Tolman, 99
- Cementing material of conglomerates and sandstones: Hayes (A A), 57a
- Chert in Burlington limestone, origin: Tarr (W A), 17
- Classification of geologic processes: McGee, 88e
- Clastic sediments, mechanical composition: Udden, 14c
- Clay slips, origin: Wilson (W B), 16
- Clay veins in coal beds: Gresley, 98
- Cleavage: Van Hise, 96; slaty: Becker, 96
- Climate and terrestrial deposits: Barrell, 08
- Climatic features in the land surface: Penck, 05
- Coal, formation of: Twenhofel, 10; White (D), 08; formation of various grades: Campbell (M R), 05; rate of deposition: Ashley, 09b
- Coal seams, feature of: Gresley, 90
- Coastal drift sands: Olsson-Seffer, 08
- Color of rocks: Rogers (W B), 56
- Colorado Plateau region: Gilbert, 75
- Concentration as a geological principle: Russell 07a
- Concretions, geological effects: Todd, 03d; log-like, in Laramie: Todd, 96b
- Cone in cone structure: Broadhead, 07; in coal Woodruff, 13b
- Continental deformation, experiments relating to: Chamberlin (R T), 18b
- Continental deposition: Keyes, 16c
- Continental elevation preceding Pleistocene period: Spencer (J W), 90
- Continental problems: Gilbert, 93a
- Continental shelf, origin: Cotton, 18
- Continental structure, theory of: Willis, 07c
- Continents and oceans, origin: Love, 08
- Contractional hypothesis, criticism of: Dutton, 74
- Corrasion of quartz pebbles: Smyth (C H), 05a
- Creep of land: Thompson (G), 90
- Crenitic hypothesis: Am G, 91
- Criteria of continental deposits: Kindle, 11c
- Cross banding by current action: Woodworth, 01a
- Cross bedding: Gilbert, 99c; White River formation, S. Dak.: Winchester, 13
- Cross-fiber veins, origin: Taber (S), 16
- Crushing effects of glacial ice sheet: Tight, 91
- Crustal adjustment, upper Mississippi Valley Keyes, 94e
- Crustal quiescence and readjustment: Chamberlin (T C), 99
- Crustal shortening: Van Hise, 98
- Crystalline rocks, formation: Daubrée, 59
- Currents, bottom: Kindle, 15b; transporting power: Rogers (W B), 48



## Physical geology—Continued.

- Daubrée experiment and capillarity: Johnston (J), 14  
 Definitions: McGee, 88e  
 Deformation of crust, cause: Reyer, 92  
 Deformation of limestone: Newland, 17  
 Deformation of rocks: Adams (F D), 10a, 17; Van Hise, 96, 96c  
 Deformation of unconsolidated beds: Kindle, 17b  
 Deformation, periodic: Chamberlin (R T), 14  
 Delta experiments: Smith (A L), 09  
 Denudation, rate: Reade, 85  
 Deposits, economic, origin: Crosby, 94b  
 Deposits formed by plant life: Weed, 92c  
 Desert regolith: Keyes, 16c  
 Desiccation, Great Basin region: Blake (W P), 68c  
 Desiccation of the earth: Von Herrmann, 18  
 Diagonal trends in earth's crust: Martin (D S), 89  
 Diastrophism: Chamberlin (T C), 13b  
 Dikes and veins, formation: Shaler, 99c, e  
 Dirt storms: Hershey, 99  
 Dislocations, Atlantic Coastal Plain: Hollick, 94f  
 Displacement through intrusion: Dana (J D), 85f  
 Disruption of rock by lightning: Barnett, 08b  
 Distorted pebbles, origin: Jackson, 60; Rogers (W B), 61a  
 Diversion of water courses by rotation of earth: Gilbert, 85b  
 Divisions between layers of stratified rocks, origin: Shaler, 88c  
 Dolomitization: Stebinger, 16  
 Dome structure in conglomerate: Arnold, 07a  
 Downwarping along joint planes: Burling, 17  
 Drift ice, work of: Prest, 02, 03  
 Dustfalls, March, 1918: Winchell (A N), 18, 18a  
 Earth a failing structure: Hayford, 07  
 Earth as a generative structure: Chamberlin (T C), 08b  
 Earth, interior of: Lane, 06c; rigidity of: Hoskins, 06; See, 06c  
 Earth-crust movements: Le Conte, 97  
 Earthquakes: Lyman (C S), 59  
 Earth's crust, average composition: Clarke (F W), 06; strength of: Gilbert, 90b  
 Elevation and subsidence: Le Conte, 84a  
 Encroachments of the sea: McGee, 90a  
 Eolian action limited by ground water: Pogue, 11a  
 Equilibrium between carbon dioxide of atmosphere and calcium compounds of water: Stieglitz, 09  
 Erosion observations, Clifty and Butler ravines, Jefferson Co., Ind.: Culbertson, 12  
 Etching of quartz in the interior of conglomerates: Fuller, 02b  
 Excavation deformations: MacDonald (D F), 13e  
 Excavations in rocks by sea urchins: Fewkes, 90a  
 Exfoliation concave: Matthes, 14c  
 Expulsion of gases from earth: Shaler, 96b  
 Faulting in veins: Church, 92  
 Fissility: Van Hise, 96

## Physical geology—Continued.

- Fissure veins, origin: Emmons (S F), 88a  
 Fissures, origin: Shaler, 99e  
 Fissuring: Glenn, 96b  
 Flexure of rock: Ashley, 93  
 Floating sand: Simonds, 96  
 Florida reefs, formation: Horsford, 52  
 Flow of rocks: Adams (F D), 97b, 98c, 01a, 09, 11a, 12b  
 Flow of solids: Hallock, 92  
 Fluxion, pressure: Lewis (H C), 86c  
 Footprints, formation: Russell, 77  
 Fossil frost cracks: Udden, 95  
 Fossilization: Dale, 79c  
 Fracture systems, correlation: Hobbs, 05b; spacing: Scott (I D), 14  
 Fractures in coal beds: Udden, 08b  
 Fracturing, recent, in Potsdam sandstone, Pa.: Rand, 70  
 Fracturing of rocks: Becker (G F), 14  
 Friction and limiting strength of rocks: King (L V), 17  
 Frost, action in arranging earthy material: Kerr, 81a; action on soil: Roberts, 03  
 Frost crystals formed underground: Neiswender, 13  
 Frost drift, North Carolina: Kerr, 76  
 Fulgurites: Julien, 01  
 Furrows dependent on structure: Adams (C B), 47a  
 Fusion of minerals under high temperature: Day (A L), 06  
 Garnet zones, formation: Kemp, 06b  
 Gas ejections from earth: Shaler, 96b  
 Gases in earth's crust, action of: Lane, 94  
 Gases in rocks: Chamberlin (R T), 08, 09  
 General: Arey, 11; Barrell, 18a; Branner, 98; Brigham (A P), 95a; Crosby, 92; Dana (J D), 56b, 73e; Fenneman, 16; Gilbert, 71; Grabau, 13; Haworth, 81; Hitchcock (E), 35; Hixon, 11; Hunt, 73d; Iddings, 14; Jackson, 43e; King (F H), 86; Leith, 13; McGee, 81; Mallet, 73; Mather, 44, 45; Powell, 84b; Rogers (H D), 58b, d; Rogers (W B), 60b; Schuchert, 18; Van Hise, 98, 04; Von Engeln, 13; Winslow, 70  
 Genetic classification: Keyes, 98b  
 Geologic deposits, classification: Crosby, 94b; Raymond (R W), 94  
 Geologic periods, cause: Taber (C A M), 07  
 Geologic processes, syllabus: Keyes, 14a  
 Geologic thermometry: Wright (F E), 10  
 Geosyncline, western interior: Van Tuyl, 17  
 "Giant ripples," formation: Bucher, 17a  
 Glacial erosion: Tarr, 93  
 Glacial lunoid furrows, origin: Packard (A S), 90  
 Glaciers, action: Shaler, 90e  
 Gneiss, secondary banding in: Hobbs, 92  
 Gneissic structure, artificial production of: Wright (F E), 07c  
 Granitic rocks, concentric structure: Shaler, 69  
 Gravel as a resistant rock: Rich, 11  
 Gravels, formation and distribution: Gregory (H E), 15a  
 Great Lake region, terrestrial stability: Spencer (J W), 16a  
 Growing crystals, linear force: Becker, 05b



## Physical geology—Continued.

Gypsum and anhydrite: Wallace (R C), 14a  
 Gypsum and salt deposits, origin: Branson, 15a  
 Heat and cold: Wallace (S J), 84  
 Heave-fault slipping, cause: Wood (H O), 15a  
 High tides, Paleozoic: Davis (W M), 84b; in geologic history: Newberry, 84c  
 Homocline and monocline: Daly (R A), 16  
 Humus acids, geologic action: Julien, 80a  
 Hydrothermal alteration: Stephenson (E A), 16  
 Ice, transportation by: Stone (G H), 81b  
 Ice motion: Case, 95  
 Ice movement on lakes: Atwood, 91  
 Ice on Canadian lakes: Tyrrell, 10a  
 Ice phenomena: Bell (R), 87a  
 Ice ramparts: Buckley, 01a; Griggs, 09  
 Ice streams, meridional deflection: McGee, 85  
 Indicia of dip in rocks: Logan, 18a  
 Induration of sandstones and quartzites, Wisconsin: Irving, 83e  
 Influence of earth's rotation upon the lateral erosion of streams: Eakin, 10  
 Intermont plains of the arid region: Keyes, 08b  
 Intraformational breccias and conglomerates, origin and classification: Field, 16  
 Intraformational contorted strata, Trenton Falls: Miller (W J), 15  
 Interference ripples: Kindle, 14e  
 Intrusions, nature of: Russell, 96a  
 Laccoliths: Cross, 94b  
 Laccolithic intrusion, mechanics of: Keyes, 18f  
 Lacustrine and marine deposits, method of distinguishing: Matthew (G F), 83a  
 Lake basins, created by wind erosion: Gilbert, 95b; glacial origin: Selwyn, 85b; New England, origin: Shaler, 66b  
 Lake Erie region, recent crustal movements: Decker, 15  
 Lake ramparts: Broadhead, 79b; origin: Gilbert, 08  
 Lake Superior region: Schoolcraft, 43  
 Landslides, effects on strata: Spencer (J W), 87a; effects on topography: Russell, 98e  
 Lateral movements of earth's crust: King (F H), 85  
 Lateral pressure: Niles, 76  
 Leveling without baseleveling: Davis (W M), 05d  
 Lightning effects: Hallock, 01  
 Limestone, formation: Dana (J D), 52c; Horsford, 52; near tide level: White (D), 12b  
 Limestone formation, influence on atmosphere: Chamberlin (T C), 98c  
 Linear force of growing crystals: Becker, 16a  
 Lodes, veins, and beds, irregularities: Kohler, 87  
 Mangroves in southern Florida, geologic work: Vaughan (T W), 09a  
 Marble, flow of: Adams (F D), 10e  
 Marginal sedimentation: Cotton, 18  
 Marine currents and river deflection: Daly (R A), 01a  
 Markings on coal: Lewis (S), 55a  
 Marl in peat bogs, origin: Jackson, 59j  
 Maturity in Alpine glacial erosion: Johnson (W D), 04

## Physical geology—Continued.

Mechanics of Allegheny structure: Ashley, 08; of intrusion: Paige, 16a; of vein formation: Taber (S), 18a  
 Metamorphic cycle: Leith, 07b  
 Metamorphism: Van Hise, 04; phases and definitions: Daly (R A), 17; of sedimentary rocks: Hunt, 57i  
 Migration of poles: Barrell, 14b  
 Mineral matter of sea: Salisbury, 05  
 Mineralogical evolution: Hunt, 88b  
 Moon, place of origin: Pickering, 07  
 Mosses and algae, work of: Weed, 91a  
 Mounds, origin: Reagan, 08  
 Mounds formed by mineral crystallization: Hess, 10c  
 Mountain elevation, effect on temperature: Wallace (S J), 81  
 Movement in crust of earth: Powell, 98  
 Mud cracks: Kindle, 17a  
 Nitrogen, abstraction from atmosphere: Vanuxem, 27  
 Ocean, age: Becker, 10a, b  
 Ohio, Cincinnati region: Fenneman, 16  
 Ohio black shale, source of bituminous matter: Orton, 83  
 Oolites, formation: Cayeux, 07a  
 Orbicular and concretionary structure, origin: Blake (W P), 05b  
 Parting in coal bed: Rogers (G S), 14b  
 Peat deposits as geological records: Davis (C A), 08  
 Pebble deposits: Bagg, 12a  
 Pebble-covered plains in arid regions, origin: Blake (W P), 03c  
 Pebbles, concretions, and conglomerate in veins: Halse, 05  
 Peléoliths: Winchell (N H), 04b  
 Pelitic sediments and magmatic differentiation: Hobbs, 13b  
 Pellets, formation: Udden, 93  
 Pegmatite veins, formation: Brögger, 94  
 Pegmatites, origin: Crosby, 94c  
 Phosphorus, geologic rôle: Blackwelder, 16, 16a  
 Physics of the earth: See, 08  
 Physiographic processes: Powell, 95b  
 Pit and mound structures: Kindle, 16c  
 Plants as geological factors: Shimek, 03a  
 Polished pebbles: George (R D), 07  
 Pressure, effects on rocks and minerals: Johnston (J), 15a  
 Pressure fluxion: Lewis (H C), 86c  
 Pressure within the earth: Slichter, 98  
 Pre-Cambrian ocean: Daly (R A), 12b  
 Primeval earth, chemical conditions: Hunt, 58b  
 Prismatic structure: Sosman, 15, 15a  
 Problems: Dutton, 89a  
 Profile of equilibrium of subaqueous shore terrace: Fenneman, 02a  
 Protocarbonate of iron, origin: Rogers (W B), 56  
 Protozoa as rock-building agents: Friedrich, 89c  
 Pseudobrecciation in Ordovician limestones: Wallace (R C), 13  
 Pseudostratification, Santa Barbara Co., Cal.: Louderback, 12



## Physical geology—Continued.

- Pyrite oxidation producing heated strata: MacDonald (D F), 12, 12a; Williams (H S), 12a
- Quartz pebbles of sandstone, origin: Brainerd, 51
- Quartz veins, origin: Frazer, 76c
- Rain drops, so-called, origin: Desor, 50a
- Rainfall affected by uplift and denudation: Jefferson, 07a
- Rainfall variation, cause and geological value: Shaler, 75d
- Recurrent tetrahedral deformations and intercontinental torsions: Emerson, 17a
- Red Beds, origin: Knight (S H), 17; Tomlinson, 16
- Redistribution of elements in formation of sedimentary rocks: Mead (W J), 07
- Reef-building and land-forming seaweeds: Howe (M A), 12
- Ring structures in silica: Stansfield, 18a
- Ripple marks: Epry, 14; Jaggar, 94; Kindle, 17; Spurr, 94c; Udden, 16c; Medina sandstone: Branner, 01
- Ripple marks, tracks, and trails: Brown (A P), 12
- River bends and bluffs: Heiney, 01
- River deflection: Daly (R A), 01a
- Rock flexure: Cramer, 90
- Rock flowage: Van Hise, 98a
- Rock pressure and metamorphism: Chance, 08c
- Rock-boring shells, geologic significance: Barrow, 13
- Rocks, formation: Ells, 95f
- Rocks, internal friction during deformation and plasticity: Adams (F D), 17a
- Rock-salt beds, formation: Ochsenius, 88
- Salt crystals, growth: Long, 17
- Salt separation from saline water and mud: Kindle, 18a
- Sand grains, rounding of: Ziegler, 11a
- Sand transportation by rivers: Graham (J C), 90
- Sand waves: Willey, 08b
- Sand-plain formation, season and time elements: Fuller, 99; growth, rate of: Fuller, 99a
- Sandstone disintegration: Merrill (G P), 00d
- Schistosity: Becker, 96
- Schists and gneiss, formation: Hitchcock (E), 61d
- Secular decay: Tarr, 92b
- Sedimentary deposition: Willis, 93
- Sedimentation and folding: Willis, 94
- Sedimentary rocks, origin and age: Schaeberle, 08b
- Segmentation of earth: Chamberlin (T C), 14b
- Segregation process: Tarr, 94d
- Shape of pebbles: Gregory (H E), 15
- Shore ice, peculiar formation of: Case (E C), 06
- Shores, ancient, evidences: Willis, 96a
- Silica, deposition: Lindgren, 17
- Silicic acid in waters of mountain streams: Headden, 03
- Silicification of fossils: Bassler, 08
- Sinter, siliceous, formation: Weed, 89a
- Slags, natural, Wyoming: Bastin, 05
- Slickensides: Lawson, 09

## Physical geology—Continued.

- Soil flow: Hobbs, 13a
- Soil stripes in cold humid regions: Hobbs, 10
- Solar agency: Kerr, 70b
- Solution and cementation in arid regions: Free, 10
- South Jogjins deposits, rate of accumulation: Rogers (W B), 59c
- Striations in gravel bars: Barnett, 08
- Submarine solution of limestone: Mayer, 16
- Submarine slide: Hahn (F F), 13
- Stalactites, formation: Jackson, 56b; Rogers (W B), 56b
- Strain, production of: Wood (H O), 15a
- Strains in rocks: Becker, 93a; Niles, 76
- Stratification, origin: Wells, 51
- Stratification planes: Keyes, 99b
- Stream valleys: Rich, 14a
- Streams, deflection due to terrestrial rotation: Baines, 84; Gilbert, 84b
- Stress in rocks: Reade, 91a
- Striation by river ice: Todd, 92
- Subsidence of reef-encircled islands: Davis (W M), 18a
- Subsidence resulting from mining: Young (L E), 16a
- Superficial discoloration of rocks: Blake (W P), 05a
- Syncline as a structural type: Rickard, 03e
- Synclines of deposition: Willis, 94
- Synclinatorium and anticlinorium: Rice (W N), 06b
- Tangential movements, Great Lakes region: Decker, 16
- Terrace, formation: Nelson, 93
- Tetrahedral plan of earth: Emerson, 00
- Thermal waters, action on minerals: Jackson, 59f
- Tidal scour: Gulliver, 96b
- Tides: Newberry, 82b
- Tongue structure in folded anticlinals: Lesley, 62
- Transportation of debris by running water: Gilbert, 14
- Transporting agencies: Salisbury, 95a
- Travelling of rocks: Wickersham, 68
- Travertine, formation: Emig, 17
- Travertine falls and reefs, origin: Branner, 01a
- Trinidad, mud volcano island: Arnold, 12
- Unconformities, valuation of: Blackwelder, 09
- Underground water, work of: Shaler, 89e
- Undulations in Niagara strata: Gilbert, 05c
- Upturning sedimentary rocks: Lee (W T), 08d
- Vein cavities, origin: Nason, 01b
- Vein formation: Taber (S), 18a; central New York: Taber (S), 18
- Vein systems, relative age: Bustamante, 11
- Veins, origin: Crosby, 94b
- Veins of asbestiform minerals, origin: Taber (S), 16
- Volcanic action, nature: Daly (R A), 11a
- Volcanic waters: Hastings, 08b
- Vortices and eddies, geologic work: Jaggar, 96
- Warping, Great Lakes region: Spencer (J W), 87
- Water, function of: McGee, 08; geologic rôle: Fairchild, 17b; surface tension, effects of: Ladd, 98a
- Water-worn vein specimens: Holman, 96
- Waves: Cornish, 10
- Work of winds: Maury, 52



Physics of the earth: See, 08

Physiographic geology (general). *For regional see names of States. See also* Drainage changes.

Abandoned valleys, Ohio basin: Campbell (M R), 01a

Aggradation and degradation of valleys: Moody (A E), 07

Alluvial-cone topography: Purdue, 04a

Alluvial river terraces, development: Dodge (R E), 94

Alluvial slopes: Siebenthal, 06c

Alpine glacial erosion, grade profile: Johnson (W D), 05

Altiplanation: Eakin, 14c

Appalachian Mountains: Chickering, 82

newer and older: Emerson, 13

northern: Willis, 95; post-Jurassic history: Barrel, 13c

southern: Campbell (M R), 97c; Hayes, 94f, 95f, 99e; Keith, 94a, 96c, 02, 07c; Kerr, 83a; Pressey, 02

Appalachian Mountains system, physiographic subdivisions: Davis (W M), 09d

Appalachian peneplains, age: Shaw (E W), 18a

Archean axes: Dana (J D), 90e

Arid lands: Davis (W M), 15f

Arid monadnocks: Keyes, 08c

Arroyo formation: Dodge (R E), 02a, 10

Atlantic and Pacific types of coast: Schwarz, 12

Atlantic border region, lineaments: Hobbs, 04

Atlantic coast: Carter (O C S), 99; Meinhold, 04

Atlantic Coastal Plain: Crosby, 12; McGee, 88a; Powell, 88f; Shaler, 71; physiographic features, date of origin: Davis (W M), 91a

Badlands: Marinelli, 15

Baraboo, new term: Mansfield, 08

Barachois, bar, and tickle: Clarke (J M), 07g

Base-level, grade, and peneplain: Davis (W M), 02b

Base-leveling and organic evolution: Woodworth, 94

Base-leveling and river spacing: Shaler, 99d

Basin Range structure: Butler (B S), 13; Keyes, 13, 15l; Paige, 13a

Basin Ranges, origin: Campbell (M R), 03e; Davis (W M), 03i; Gilbert, 03e

Basin region: Gilbert, 75

Beach cusps: Jefferson, 99, 10; origin: Branner, 00; Johnson (D W), 08

Beveling: Smith (W S T), 99

Bibliography: Lobeck, 18

Block diagrams: Lobeck, 15

Bolson in Southwest, development: Meinzer, 12

Bolson plains: Tight, 05a; origin: Udden, 07a

Bolsos: Tolman, 15b

Canada, Rocky Mountain region: Dawson (G M), 01; western: Hector, 61

Canyons, character and origin; Bross, 81

Carolina coast: Abbe, 95

Caves, influence on topography: Russell, 05c

Changes of level on Atlantic coast line: Curtis, 11a

Chesapeake Bay region: McGee, 86b

Chronologic cartography: Chamberlin (T C), 91a

Physiographic geology—Continued.

Cirques and U-shaped mountain valleys: Coleman, 13h

Classification of topographic forms: Perry, 93

Cliffs, glacial origin: Davis (W M), 89e

Climate and terrestrial deposits: Barrell, 08

Climatic features in the land surface: Penck, 05

Coast lines: Curtis, 98

Coastal drift sands: Olsson-Seffer, 08

Coastal forms, classification: Gulliver, 98, 99

Coastal plains: Davis (W M), 07d

Coasts, lowland, types: Gulliver, 96a

College physiography (textbook): Tarr (R S), 14

Colorado Canyon: Davis (W M), 09b

Colorado Plateau region: Gilbert, 75, 76a

Colorado plateaus: Powell, 80

Colorado River: Powell, 75; consequent origin: Jefferson, 97

Cones, volcanic, geometrical form: Becker, 85c

Connecticut, Turners Falls: Jefferson, 98

Conoplain: Ogilvie, 05a

Continental forms, origin: Baker (H B), 13

Continental margin: Verrill, 83

Continental shelf: Shaler, 80b; Upham, 93h; origin: Cotton, 18

Continents and oceans, origin: Love, 08

Continents and ocean basins, permanence: Le Conte, 86a

Contraposed shore lines, Juan de Fuca strait: Clapp (C H), 13a; Keyes, 15q

Convexity of hilltops; Gilbert, 09b

Cordillera, North American, nomenclature of: Daly (R A), 06c

Cordilleran region: Gilpin (W), 57; Powell, 76

Criteria for peneplains: Trowbridge, 13

Cross cutting and retrograding of stream beds: Dellenbaugh, 12

Cuestas, drainage: Davis (W M), 99a

Current notes: Davis (W M), 95b

Cusped forelands: Gulliver, 96; wave-formed: Tarr, 98a

Cycle of Alpine glaciation: Hobbs, 10b

Débris fans: Hilgard, 02

Deflection of rivers by the earth's rotation: Davis (W M), 07

Delta, of Mississippi: Hilgard, 06b; McBeth, 05a; of Rio Colorado: Macdougall, 06

Description of land forms: Davis (W M), 00f, 09c, 10a, 12; Jaeger, 15

Desert, lineaments of: Keyes, 09i

Desert deltas, rate of growth: Keyes, 18a

Desert depressions, origin: Hobbs, 18

Desert pavements: Free, 11a

Desert ranges: Paige, 12h; wind action on: Keyes, 09d

Desert regions: Hill (R T), 02g; Lawson, 15

Dictionary of topographic forms: Wilson (H M), 00

Discrete material: Gilbert, 98d

Drainage modifications: Campbell (M R), 96t

Driftless Area, upper Mississippi Valley: Chamberlin (T C), 85a; Trowbridge, 15

Earth's plan: Taylor (F B), 10

Eastern Iowa: Gilbert, 83c

Enisled relief: Keyes, 13i

Ephemeral lakes, arid regions: Keyes, 03b

Epicene profiles in desert lands: Keyes, 17d



## Physiographic geology—Continued.

- Erosion, great plains and Cordilleran mountains: Upham, 04b  
 Evolution of earth's features: Hitchcock, 00  
 Evolution of geographic forms: Brigham (A P), 92  
 Evolution of topographic forms: Brigham (A P), 95a  
 Experimental physiography: Hubbard, 07  
 Fall line, Atlantic Coastal Plain: Abbe, 03  
 False fault scarps of desert ranges: Keyes, 15l  
 Fault scarps of Basin Ranges: Keyes, 11f  
 Features: Powell, 95c; of erosion by unconcentrated wash: Fenneman, 08; produced by glacial erosion: Chamberlin (T C), 11b  
 Field work: Davis (W M), 02c; Low, 05a  
 Fiords, nature and origin: Johnson (D W), 15  
 Flood plains and terraces: Fuller, 16  
 Flood plains without floods: Fenneman, 06  
 Forest physiography: Bowman (I), 11  
 Gaspe Point, cusped foreland: Brown (R M), 02b  
 General: Am Geog Soc, 15; Baker (H B), 17; Branner, 98; Dana (J D), 47b, 66; Davis (W M), 85, 88a, 98, 02d, 05; Eggleston, 04; Gilbert, 98a; Grabau, 13; Hall, 57c; Hill (R T), 00; Hobbs, 03c; Hunt, 73d; Le Conte, 72; Lesley, 69; McGee, 88d; Matthew (W D), 15b; Owen (R), 81, 87a; Penck, 05; Purdue, 12d, 14e; Richardson (J), 51a; Rogers (H D), 58e; Russell, 04b; Shaler, 94, 98; Tarr, 93d  
 Geographic classification: Davis (W M), 85  
 Geographical cycle: Davis (W M), 01a, 05b; Keyes, 16b; in arid climate: Davis (W M), 05c, 06a  
 Geographical description: Davis (W M), 10; principles: Davis (W M), 16  
 Geographical essays: Davis (W M), 09  
 Geologic dates, use of: Rich, 18a  
 Girdled mountain: Keyes, 16a  
 Glacial canyons: McGee, 83f, 94c  
 Glacial sculpture: Hobbs, 11  
 Glaciated regions: Davis (W M), 82a  
 Gorges and waterfalls: Davis (W M), 84  
 Gorges of Finger Lake region: Tarr, 06b  
 Graded surfaces: Gulliver, 08  
 Grading of mountain slopes: Davis (W M), 98a  
 Grand Canyon, single cycle development: Robinson (H H), 11  
 Gravel plains: Rich, 11  
 Great Basin: Russell, 88  
 Great Basin ranges, deformation: Baker (C L), 13  
 Great Lake basins: Spencer (J W), 13a  
 Great Lakes, origin: Spencer (J W), 82b; and drainage: Newberry, 82e; pre-glacial formation: Claypole, 79  
 Great Lakes region: Maw, 78; Russell, 98d; Schoolcraft, 43  
 Great Plains: Waldbaur, 15; subsidence basins: Johnson (W D), 99b  
 Green River, origin: Emmons (S F), 97c  
 Gulf Coastal Plain: Sutherland, 08  
 Gulf of Mexico, basin of: Hilgard, 81  
 Hanging valleys: Davis (W M), 07c; Johnson (D W), 09a

## Physiographic geology—Continued.

- Harbors, geologic history: Shaler, 93  
 Harrisburg peneplain: Campbell (M R), 03a  
 Hemicones: Decker, 15a  
 High Plains: Johnson (W D), 01  
 High-school course in physiography: Fairbanks, 09  
 Hudson River submarine canyon: Spencer (J W), 04a  
 Inclination of surface, determination from contour map: Rich, 17  
 Influence of earth's rotation upon lateral erosion of streams: Eakin, 10  
 Intercision, a drainage modification: Goldthwait, 08b  
 Intermont plains of the arid region: Keyes, 08a  
 Interpretation of topographic maps: Salisbury, 08a  
 Island tying: Gulliver, 05  
 Laboratories for physical geography: Wright (C T), 09  
 Laboratory for physiography: Stearns, 09  
 Laboratory for topographic work: Mead (W J), 09  
 Laboratory manual of physical geography: Hopkins, 09; Tarr (R S), 10b  
 Laboratory work: Clem, 12  
 Lacustral record of past climates: Keyes, 18  
 Lafayette formation: McGee, 91b  
 Lake basins, classification: Davis (W M), 82  
     glacial origin: Selwyn, 85b  
     origin: Dawson, 73g  
 Lake beds of prairie region: Wallace (S J), 69  
 Lake Erie region, recent crustal movements: Decker, 15  
 Lake George: Kemp, 01e  
 Lake ramparts, origin: Gilbert, 08  
 Lake shores, topographic features: Gilbert, 85  
 Lake Superior highlands, origin and age: Keyes, 15d  
 Lake Superior region: Martin (L), 11; Van Hise, 11  
 Lakes with more than one outlet: Watson, 97b  
 Land connection with Europe: Blanchard, 91  
 Land forms, classification: McGee, 91h  
     notes on: Davis (W M), 07  
     produced by glacial erosion: Davis (W M), 10d  
 Land reliefs true to nature: Curtis, 11  
 Land sculpture: Hicks, 93b  
 Landslides, effects on topography: Russell, 98e  
 Laramie region: Blackwelder, 09a  
 Leveling without base-leveling: Davis (W M), 05d  
 Manual of excursions: Martin (L), 13h  
 Mapping of land forms: Matthes, 08  
 Maturity in Alpine glacial erosion: Johnson (W D), 04  
 Meander belts, limiting width: Jefferson, 02  
 Meanders and scallops: Jefferson, 10a  
 Meanders on the Rouge: Davis (D H), 08  
 Meandering of Buffalo River: Griggs, 06  
 Mesas, wind-graved: Keyes, 12h  
 Methods of American geographic investigation: Davis (W M), 08a  
 Migration of divides: Smith (W S T), 97  
 Mississippi, upper: Martin (L), 16a



**Physiographic geology—Continued.**

- Mississippi delta plain: Hilgard, 70b
- Mississippi drainage system: Westgate, 93
- Mississippi Valley: Hart, 12; Leverett, 95b
  - lower: Hilgard, 84b
  - upper: Hershey, 97b; Warren (G K), 68
- Modelling of physiographic forms in laboratory: Hobbs, 10c
- Mountain elevations, uniformity in: Heilprin, 05
- Mountain glacial erosion: Hobbs, 16a
- Mountain growths of Great Plains: Willis, 02b
- Mountain structures in plains: Keyes, 15h
- Mountains, study of: Davis (W M), 07b
- Nantasket beach: Reed (W G), 08
- Naturalistic relief models: Curtis, 15d
- New England: Shaler, 87; southern: Davis (W M), 91d, 93, 95; grade plains: Gulliver, 96c
- New England peneplain in White Mountain region: Lobeck, 16
- New Mexico, Jemez-Albuquerque region: Reagan, 03
- New terms: Cairnes, 12c
- Nomenclature: Johnson (D W), 16a; of surface forms on faulted structures; Davis (W M), 13b
- North America: Rogers (H D), 35, 56; Russell, 04; Shaler, 84c
- North America and Europe: Penck, 09
- Ocean basins, origin: Chamberlin (T C), 03a
- Original streams and desert-leveling: Keyes, 13c
- Ozark dome: Keyes, 98j
- Ozark uplift: Davis (W M), 93a
- Pacific coast region: Carter (O C S), 99; Dawson (G M), 78c; Diller, 94, 15b; Holway, 15b
- Pacific-Atlantic connection: Spencer (J W), 95d
- Pebble-covered plains in arid regions: Blake (W P), 03c
- Peneplain: Daly (R A), 99b; Davis (W M), 96; Tarr, 98
- Peneplanation: Davis (W M), 02b; Smith (W S T), 99
- Physical geography: Davis (W M), 08
  - exercises: Davis (W M), 10c
  - in the secondary school: Fenneman, 09a
- Physiographic changes and ore alterations: Atwood, 15a
- Physiographic descriptions, technique: Davis (W M), 07
- Physiographic development in arid regions: Keyes, 12a
- Physiographic divisions of North America: Thayer, 18; of the United States: Fenneman, 14; Matthes, 15a
- Physiographic features: Powell, 95c
- Physiographic problems of to-day: Russell, 04b
- Physiographic types: Gannett, 98, 00
- Physiography: Fairbanks, 09; relations to other sciences: Penck, 06
- Piedmont Plateau: McGee, 96b
- Piedmont terraces of northern Appalachians, origin: Barrell, 13b
- Plains, planes, and peneplanes: Johnson (D W), 16a
- Plains of denudation: Davis (W M), 96
- Plateau plains, arid regions: Keyes, 12g

**Physiographic geology—Continued.**

- Plateaus of the Colorado: Margerie, 84
- Playas and playa lakes: Russell, 83a
- Potomac River, geographic history: Willis, 07a
- Prairies: Whitney, 76; origin: Hay, (O P), 78
- Processes: Powell, 95b
- Profile of equilibrium of subaqueous shore terrace: Fenneman, 02a
- Progress of interpretation of land forms: Gregory (H E), 18a
- Pseudo-cols: Chamberlin (T C), 94f
- Ravines in prairies, origin: Sawyer, 75
- Rational relief representation: Curtis, 03b
- Regional slopes: Reinecke, 16b
- Relation of geography to geology: Davis (W M), 12a
- Relation of geology to topography: Martin (L), 09
- Repeating patterns: Davis (W M), 11a; Hobbs, 11b; Kemp, 11e
- Representation of land forms in the physiography laboratory: Tarr, 08a
- Representation of topographic forms: Matthes, 15
- Rifted relict-mountain: Clarke (J M), 15c
- River bends and bluffs: Heiney, 01
- River terraces, New England: Davis (W M) 01c
- Rivers, types of: Dappert, 06
- Rocky Mountain region: Evans (H F), 07c
- Rocky Mountains, age of peneplains: Atwood, 17a
  - age of peneplains: Blackwelder, 17
  - Cretaceous-Tertiary time: Ashley, 15b
  - southern, Mesozoic: Lee (W T), 18
- Rotation of earth, effect on topography: Kerr, 73a
- St. Lawrence River, scour, and lowering of Lake Ontario: Spencer (J W), 16b
- Scarps: Davis (W M), 07
- Scaurs on the River Rouge: Jefferson, 04
- Scenery, geology of: Merrill (F J H), 94
- Scenery, soil, and atmosphere: Brigham (A P), 10
- Sculpture of mountains by glaciers: Davis (W M), 06d
- Sea barriers and drainage: Newsom, 99
- Sea shelf: Chamberlin (T C), 98a
- Section, Hanover to Vincennes: Newsom, 98
- Seismotectonic lines: Hobbs, 07k
- Shore-line studies: Wilson (A W G), 08
- Shore lines of elevation, accumulation of inherited features: Goldthwait, 11b
- Sink-hole lakes: Sellards, 06
- Slopes of hills: Campbell (J T), 84
- Solar agency: Kerr, 70b
- Southeastern United States: McGee, 91b
- Step landscapes: Waldbayr, 15
- Stream valleys: Rich, 14a
- Striations and U-shaped valleys not produced by glacial action: Hovey, 09
- Structure, influence on topography: Lyman, 98
- Subdivision of North America into natural regions: Joerg, 14
- Subdivisions of United States: Powell, 95d
- Submarine banks: Davis (W M), 18
- Submarine channels, continental shelf: Spencer (J W), 05b



## Physiographic geology—Continued.

- Submarine valleys, Atlantic coast: Spencer (J W), 03
- Submarine valleys on continental slopes: Upham, 92e
- Submerged valleys: Davis (W M), 13a
- Suess's theories tested: Davis (W M), 05
- Summit level accordance of mountains: Daly (R A), 05a
- Synclinal mountains and anticlinal valleys: Davis (W M), 88c
- Talus, peculiar form: Spencer (A C), 00a
- Teaching, methods and models: Davis (W M), 89
- Teaching physiography: Von Engeln, 11b
- Terminology: Salisbury, 04
- Terraces of West River, Vt.: Fisher (E F), 06
- Terracing of bajada belts: Keyes, 17a
- Texas region: Hill (R T), 00
- Textbook: Arey, 11; Davis (W M), 98b; Fairbanks, 06; Gilbert, 02; Hopkins (T C), 08a; Martin (L), 13h; Salisbury, 07; Tarr, 97a, b, 04
- Tidal sand cusps: Gulliver, 95
- Tombolos: Gulliver, 05
- Topographic forms, stages in development: Johnson (D W), 05b
- United States: Wilson (H M), 01
- Topographic maps of United States: Davis (W M), 17
- Transcontinental excursion, 1912: Am Geog Soc, 15
- Transcontinental guidebook: Davis (W M), 12c
- Transverse mountain valleys, origin: Le Conte, 98
- Types of orographic structure: Powell, 76a
- Types of surface: McGee, 90c; eastern half of United States: Lesley, 69
- Uniformitarianism and physiography: Davis, (W M), 95a
- United States: Blackwelder, 12; Davis (W M), 12c; Nat Geog Soc, 96; Oestreich, 15a
- eastern, Catoclin belt: Keith, 94a
- geographic provinces: Jefferson, 18
- origin of physical features: Gilbert, 98a
- physiographic divisions: Fenneman, 17, 17a
- topographic atlas: Russell, 00a
- U-shaped channels: Matthes, 04a
- U-shaped mountain valleys: Coleman, 13h
- Valley configurations in low altitudes: Chamberlin (T C), 10b
- Valley fill, Great Basin region: Keyes, 15f
- Valley filling by intermittent streams: Parkins, 11
- Valleys, classification: Powell, 74a
- incised meandering: Davis (W M), 06
- types and origin: Powell, 75a
- Volcanic topography: Smith (E M), 09
- Water planes, ancient: Robinson (H H), 08
- Western States: Hayden, 80
- Wet laboratory in physiography teaching: Von Engeln, 08
- Wind gaps: Miller (A M), 15a
- Wolds and vales of belted coastal plains: Davis (W M), 07
- Zones of elevation: Ross, 72
- Physiographic features: Powell, 95c

- Physiographic processes: Powell, 95b
- Physiographic regions of the United States: Powell 95d
- Phytosauria: McGregor, 06; Triassic: Mehl, 15
- Piedmont folio, W. Va.-Md. (no. 28): Darton, 96b
- Piedmont Plateau: McGee, 96b; granitic rocks: Williams (G H) 95
- Pigeon Point, Minn.: Daly (R A), 17b
- Pikes Peak folio, Colo. (no. 7): Cross, 94
- Pikeville folio, Tenn. (no. 21): Hayes, 95b
- Pikeville quadrangle, eastern Tenn.: Phalen, 11
- Pillow lava, origin: Lewis (J V), 14
- Watchung Mountains, N. J.: Lewis (J V), 15b
- Pinitization, Conception Bay, Newfoundland: Buddington, 16
- Pinos Altos district, N. Mex.: Wade (W R), 14a
- Pioche, Nev.: Pack, 06, 06a
- Pipestone quarry: Hayden, 66d, 67a
- Pipestone, Devil's Lake, Wis.: Woodman, 82
- Pisces.
- Actinophorus, Ohio: Claypole, 95c
- Actinopteri: Cope, 86e
- Actinopterous fishes, Cretaceous: Hay (O P), 03
- Aetobatis poeyii (placoid), Cuba: Fernández de Castro, 73
- Alberta, Banff, ganoid fishes: Lambe, 16; Cretaceous selachian: Lambe, 18b
- Amyzon brevipinne Cope: Lambe, 06g
- Anogmus polymicrodus, osteology: Stewart (A), 99d
- Arthrodira: Dean, 93a, 01; Hussakof, 06, 09, 11
- dipnoan affinities: Dean, 07; Eastman, 06
- position: Hussakof, 08a
- Arthrogathi, relationships: Dean, 01b
- Asteracanthus, Glasgow, Tenn.: Leidy, 70e
- Bibliography: Dean, 16
- Bothriolepis: Patten, 04, 05
- Brain structures: Eastman, 13
- British Columbia: Cope, 94a
- California: Agassiz (L), 55, 57; Jordan, 07
- Camposus and Edestus: Eastman, 17b
- Campyloprion: Eastman, 02d
- Carboniferous: Cope, 91b; Eastman, 02c; Hitchcock (C H), 68b; Leidy, 56; Newberry, 97
- central West: Eastman, 03a
- Illinois and Missouri: Leidy, 57f
- Ohio: Newberry, 56d
- sharks: Eastman, 02
- Carcharodon: Dean, 09a
- Carcharodon mortoni: Lucas (F A), 92
- Catalog of fishes in the Carnegie Museum: Eastman, 11a
- Catopterus, Connecticut Valley: Davis (C H S), 87
- Cephalaspidæ: Patten, 03
- Cephalaspis, Gaspé: Lankester, 70; scales: Eastman, 04c
- Ceratodus, Jurassic: Marsh, 78
- Cestraciont shark, Triassic, California: Bryant (H C), 14
- Cestraciont sharks, phylogeny: Eastman, 02g
- Cestraciont spine, Triassic, Idaho: Evans (H M), 04
- Cestraciont teeth, Jurassic: Wemple, 06
- Chimaeroid egg case, Cretaceous: Gill, 05
- Chimaeroid fishes: Dean, 06; Cretaceous: Hussakof, 12a



## Pisces—Continued.

- Cladodus compressus, a correction: Branson, 08
- Cladodont sharks, tooth structure: Claypole, 95f
- Cladodonts, Ohio basin: Claypole, 93d, 95b, g, 03
- Cladodus: Clark (W), 98; Devonian, Colo.: Hay (O P), 02b; Ohio: Claypole, 94a
- Cladodus clarki: Claypole, 95
- Cladoselache: Dean, 94, 94a
- Classification: Cope, 77t, 78m
- Cobitidae, Idaho: Cope, 71l
- Coccosteus: Claypole, 93b
- Cochliodonts, Carboniferous: Branson, 05
- Coelacanth, Iowa Kinderhook: Eastman, 08
- Coelacanthus, Coal Measures, Ohio: Newberry, 74m
- Coelosteus, Mississippian, Illinois: Newberry, 87d
- Collection of U. S. National Museum: Eastman, 17
- Colorado, Canon City: Clarke (J M), 95a; Walcott, 91d, 92a
  - Devonian: Eastman, 04
  - Florissant: Cockerell, 08m
  - Ordovician (?): Cockerell, 13c
  - South Park, Tertiary: Cope, 75a
- Conchiopsis: Newberry, 74h
- Connecticut: Redfield, 53; Triassic: Eastman, 11; Lull, 12b
- Connecticut Valley: Redfield, 37
- Corniferous, Buffalo, N. Y.: Mixer, 86
- Crassopholos, Green River beds: Cope, 83zc
- Cretaceous: Cope, 70d, 75, 78; Leidy, 72i, 73; Morton, 35
  - Kansas: McClung, 08; Stewart (A), 98c; Williston, 00a
- Cretaceous fish locality: Hay (O P), 03d
- Cristivomer namaycush, Pleistocene, Wis.: Hussakof, 16c
- Crossopterygia: Moodie, 15b
- Ctenacanthus, Keokuk: Eastman, 97a; Ohio: Claypole, 97d
- Ctenacanthus wrighti, Yates Co., N. Y.: Newberry, 84b
- Ctenodus, Coal Measures, Ohio: Cope, 74k
- Ctenoptychius, Permian, Kansas: Martin (H T), 13a
- Cyclotomodon, South Carolina: Cope, 76e
- Cyprinoid fishes, Rocky Mountains: Leidy, 70j
- Dendrodus, Arisaig series, N. S.: Whiteaves, 98c
- Dentition, Devonian: Eastman, 00b
- Development and geologic relations: Case, 98
- Devonian: Hussakof, 18; Leidy, 56; Newberry, 62, 92
  - Campbelltown: Whiteaves, 81d
  - Canada: Whiteaves, 07
  - Iowa: Eastman, 08a
  - Missouri: Branson, 13, 14
  - New York: Eastman, 08a; Smith (B), 10
  - Ohio: Newberry, 57b; Stauffer, 09
  - Ohio basin: Claypole, 03
  - Scaumenac Bay, Que.: Hussakof, 12; Whiteaves, 81a
  - Wisconsin: Cleland, 11; Lapham, 60a
- Descriptions: Leidy, 56l, 57b; Redfield, 41; various localities: Leidy, 55b

## Pisces—Continued.

- Diacranodus, Texas: Broili, 04a
- Didymodus: Cope, 84g, q, w, 85t; Gill, 84
- Dinichthyids: Eastman, 97, 98a, 00b
  - armor plates, Marcellus shale, New York: Smith (B), 09a
  - body plates: Eastman, 96
  - northern Ohio: Branson, 09a
- Dinichthys: Branson, 08a, b, 09, 11a; Clark (W), 98; Claypole, 92d, 93f; Dean, 96a; Eastman, 02b; Hitchcock (C H), 68a; Hussakof, 05, 05a; Newberry, 88b
  - bone structure: Claypole, 94c
  - dorsal shield: Eastman, 96c
  - Huron shale: Newberry, 85f
  - New York: Ringueberg, 84a
  - Ohio: Claypole, 96c, 97
  - structure: Wright (A A), 97
  - ventral armor; Dean, 97; Wright (A A), 93, 94
- Dinichthys intermedius, Huron shale: Branson, 08a
- Dinichthys terrelli, Lorain Co., Ohio: Newberry, 74v; restoration: Branson, 08b
- Diplaspis, Silurian, New Brunswick: Matthew (G F), 87d
- Diplaspis acadica, horizon: Matthew (G F), 91d
- Diplodus, Devonian, Illinois: Eastman, 99b
- Dipnoan fish scale of Sagenodus, Mazon Creek, Ill.: Cockerell, 11c
- Diplomystus, Green River shales, Wyoming: Jordan, 10
- Dipnoi, Permian: Eastman, 03b
- Dipterus, Devonian, Colorado: Eastman, 15; Iowa: Udden, 99b
- Edestus: Eastman, 03, 05b; Hitchcock (F R M), 87; Newberry, 88g, and related genera: Hay (O P), 09e
  - Iowa: Hay (O P), 12c
  - Nevada: Dean, 97a
- Elasmobranchii, geologic distribution: Hay (O P), 01a
- Ellesmere Land, Devonian fishes: Kiaer, 15
- Enchodus, teleostean: Green, 13
- Eocene, Rocky Mountains: Cope, 86; Wyoming: Whitfield, 90a
- Erisichte: Cope, 77d, 86g
- Esmeralda formation: Lucas (F A), 00
- Eurylepis: Newberry, 57c
- Eurythorax, lungfish operculum: Hussakof, 16
- Evesthes jordani, California Miocene: Gilbert (J Z), 10a
- Fins, homologies: Cope, 90a
- Fossil aquarium: Dean, 11
- Fresh-water Tertiary, Rocky Mountains: Cope, 74c
- Gar pike, Utah: Cockerell, 09k
- General: Dean, 95; Eastman, 99c; Harlan, 34; Leidy, 56n; Marsh, 71g; Newberry, 73b, 78f, 84f
- Getalodus, Ohio: Safford, 53a
- Giant of ancient sharks: Dean, 09a
- Gillicus: Hay (O P), 98a
- Habitat of early vertebrates: Chamberlin (T C), 00b
- Helodont teeth, Alberta: Lambe, 13



## Pisces—Continued.

- Helodus, Pennsylvania: Eastman, 09  
 Heteracanthus, Iowa: Lindahl, 97  
 History, in older rocks: Newberry, 74l  
 Holonema: Williams (H S), 91b, 93c  
 Holoptychius, Bradford Co., Pa.: Claypole, 83b  
 Hydrocyon, fossil allies: Eastman, 17a  
 Ichthyodectes: Hay (O P), 98a  
 Ichthyodorulites: Leidy, 56b  
 Idaho, Pliocene fauna: Cope, 83m; Tertiary fresh-water: Cope, 71e  
 Illinois: Cope, 75x, 97; Hay (O P), 00; Newberry, 70b; St. John, 75  
 Alton, St. Louis limestone: McAdams, 83b  
 Carboniferous: Newberry, 66; St. John, 83; Worthen, 57  
 eastern: Cope, 78d  
 Mazon Creek: Eastman, 02a  
 occurrence: Worthen, 66c  
 Pulaski Co., Aphelichthys: Cope, 93b  
 Indiana, Macropetalichthys: Norwood, 46a  
 Harrison Co., Carboniferous: Newberry, 79a  
 Park Co.: Hitchcock (E), 56  
 Iowa, Devonian: Eastman, 97c  
 Istiophorus calvertensis, Miocene, Virginia: Berry, 17f  
 Jurassic, Black Hills: Darton, 99d; Eastman, 99a  
 Kansas: Eastman, 02f; Mudge, 75a  
 Carboniferous: Leidy, 59, 73  
 Cretaceous: Cope, 71, 72d, 73zb, 78f; Crook, 92; Loomis, 00; Stewart (A), 98, 99c, 00; Williston, 00; Teleostei: Cragin, 01  
 Lawrence: Twenhofel, 14a  
 Kentucky, Devonian and Waverlyan: Hussakof, 13  
 Lepidosteus, Green River shales: Eastman, 00a  
 Leptecodon, Niobrara beds, Kansas: Williston, 99a  
 Leptichthys, Cretaceous, Kansas: Stewart (A), 99  
 Leptomylus, Cretaceous, New Jersey: Cope, 70i  
 Leuciscus, Miocene, Nevada: Lucas (F A), 00c  
 Leuciscus rosei, Miocene, British Columbia: Hussakof, 16b  
 Lungfish remains, Coal Measures: Hussakof, 16  
 Machaeracanthus, Helderbergian, Ontario: Lennox, 86  
 Macropetalichthys: Eastman, 97d; southern Indiana: Norwood, 46  
 Marine Triassic, Aspen Ridge, Idaho: Goddard, 07  
 Maryland, Devonian: Swartz, 13c  
 Mazodus, teeth: Claypole, 97c  
 Menaspis, Permian: Dean, 04  
 Mesozoic and Cenozoic fishes: Eastman, 12  
 Mexico, Lower California: Tertiary selachians: Wittich, 14a  
 Miocene drumfish, Pogonias multidentatus: Smith (B), 09  
 Montana, Judith River: Leidy, 56d  
 Muscle fibers in sharks of Cleveland shale: Dean, 02  
 Myliobates: Gibbes, 50  
 Mylostoma: Dean, 93a, 01a; Eastman, 06a; Huron shale: Newberry, 83d

## Pisces—Continued.

- Mylostomid dental plates: Eastman, 07, 09a, b  
 Nebraska: Eastman, 02f  
 Carboniferous: St. John, 70b, 72  
 Nevada, Osino: Cope, 73v; Silver Peak district: Blake (W P), 67f  
 Newark group: Redfield (W C), 56  
 New Brunswick, Albert shales: Lambe, 09  
 Campbelltown: Traquair, 90; Whiteaves, 89c; Woodward (A S), 89, 92, 92a  
 Carboniferous: Dawson (J W), 77d  
 Hillsboro: Jackson, 51e, 52a  
 southern: Matthew (G F), 89b  
 New Jersey: Leidy, 55a; Redfield, 53  
 Boonton: Redfield, 43  
 Cretaceous and Tertiary: Marsh, 70e  
 Cretaceous, Eocene, and Miocene: Fowler, 11  
 Pompton: Redfield, 43a  
 Tertiary: Cope, 69a  
 Triassic: Eastman, 05a; Gratacap, 86  
 New York: Dekay, 42  
 Delaware Co.: Eastman, 99  
 Devonian: Mixer, 96; Williams (H S), 82c  
 Eighteenmile Creek: Hussakof, 15  
 Genesee and Portage shales: Williams (H U), 86  
 Hamilton group: Bradley, 66  
 Nomenclature: Hay (O P), 99b  
 Notogoneus, Wyoming: Woodward (A S), 96  
 Nova Scotia, Arisaig series: Whiteaves, 98c  
 Ohio: Claypole, 93; Dean, 11a, b; Hay (O P), 00; Newberry, 53e, 75  
 Cliff limestone: Newberry, 56c  
 Coal Measures: Foster, 51d  
 Cuyahoga Co.: Brainerd, 53  
 Delaware: Newberry, 68b  
 Devonian: Claypole, 93a; Dean, 99a; Newberry, 71g; and Carboniferous: Newberry, 73b  
 Erie shale: Newberry, 88k  
 Linton: Cope, 73zk, 74g  
 placoderms: Newberry, 85j  
 Ohio shales: Branson, 11a; Claypole, 88d  
 Oracanthus: Newberry, 90a  
 Ordovician: A., 91; James (J F), 91c; Black Hills: Darton, 09d  
 Ostracoderm, Scaumenac Bay, Que.: Woodward (A S), 00  
 Otoliths, Alabama and Mississippi: Koken, 88; Jackson, Mississippi: Meyer (O), 89  
 Oxyrhina, Cretaceous, Kansas: Eastman, 95  
 Pachyrhizodus, Cretaceous, Kansas: Stewart (A), 99b  
 Paired fins, origin: Dean, 93  
 Palaeaspis: Claypole, 92a  
 Palaeoniscid fish, Permian, South Dakota: Hussakof, 16a  
 Palaeoniscid fishes, Albert shales, New Brunswick: Lambe, 10a  
 Palaeoniscus, Hillsborough, N. B.: Egerton, 53  
 Palaeospondylus: Dean, 96, 99; systematic position: Gill, 96  
 Paleozoic: Cope, 86t, 91h; Dean, 12; Eastman, 02b, 16a; Hussakof, 13; Newberry, 78d, 89, 97; and Mesozoic: Cope, 95  
 Pennsylvania: Cope, 97; Hay (O P), 00  
 Catskill: Cope, 92b



## Pisces—Continued.

- Pennsylvania: Chemung: Claypole, 85e  
 Newark group: Leidy, 76b  
 Silurian: Claypole, 84h, m  
 Permian fishes: Hussakof, 11a; Texas: Cope, 83i  
 Peripristis, Caldwell Co., Ky.: Eastman, 02e  
 Permo-Carboniferous sharks: Eastman, 01  
 Petalodus: Eastman, 96a; Leidy, 76; Carboniferous, Illinois: Hay (O P), 95  
 Phlyctaenacanthus telleri: Teller, 06  
 Placoderms, Devonian, Ohio: Claypole, 92c, 93e, 94b, 95h; ancestry: Claypole, 96b  
 Placoid tooth, Cuba: Fernández, 72  
 Platysomus, Alberta: Lambe, 14b  
 Pleuracanthus: Cope, 84w; and Didymodus: Cope, 84zf  
 Plioplarchus, North Dakota: Cope, 83a; Oregon: Cope, 89f  
 Porthus: Hay (O P), 98b  
 Porthus molossus, Cretaceous, Kansas: Osborn, 04e; Sternberg, 07; Woodward, 13  
 Protosphyraena: Felix, 90a; Hay, (O P) 02d  
 Pteraspidae: Patten, 03  
 Pteraspis, Silurian, New Brunswick: Matthew (G F), 86b, 87a  
 Pterichthys: Cope, 85l; Claypole, 90b  
 Chaleur Bay: Whiteaves, 80a  
 Chemung, Pennsylvania: Claypole, 83c  
 Ptychodus: Leidy, 68h  
 Ptyctodontidae: Eastman, 04a; dentition: Eastman, 98  
 Ptyctodus, Kinderhook, Missouri: Weller, 06  
 Quebec, Scaumenac Bay: Traquair, 93; Whiteaves, 80c, 81b, 83b, 87c, 89c; Woodward (A S), 89, 92a, 00  
 Rhizodus, St. Louis limestone, Illinois: Newberry, 88j  
 Rhynchodus, dentition: Eastman, 04a  
 Rhynchodus excavatus: Newberry, 77  
 Rocky Mountain region: Cockerell, 08c  
 Sagenodus, Coal Measures, Kansas: Williston, 99b  
 Salem limestone, Indiana: Branson, 06  
 San Domingo, Tertiary: Moore (J C), 53  
 Saurian remains within fish: Eastman, 11b  
 Saurocephalus: Cope, 71j; Harlan, 24; Leidy, 57g; Kansas: Hay (O P), 99a  
 Saurodon, Kansas: Stewart (A), 98b; Moorestown, N. J.: Hays, 30  
 Saurodontidae, Kansas: Cope, 73zi, 92m  
 Scales: Cockerell, 13k, 14h  
 Sebastodes, Tertiary, California: Eigenmann, 90  
 Shark, Carboniferous, Indiana: Hitchcock (E), 56d  
 Shark related to Edestus: Hay (O P), 07b  
 Shark teeth: Leidy, 72j; Keokuk, Iowa: Desor, 50g  
 Sharks: Dean, 96c  
 California: Jordan, 13  
 chimaeroids, and arthrodires: Dean, 09  
 cladodont: Cope, 93i  
 Silurian: Claypole, 84j, m, 85a; Matthew (G F), 07  
 Snoutfishes, Kansas: Hay (O P), 02d

## Pisces—Continued.

- South Carolina: Leidy, 55a; Squalidae: Gibbes; 46, 47a  
 South Dakota, Ree Hills: Cope, 91e, 92p  
 Spiraxis, relationship: Hollick, 94d  
 Squalidae: Gibbes, 48, 50f  
 Squalus. Cuba: Melero, 75  
 Stickleback fish, Nevada: Hay (O P), 07a; nomenclature: Jordan, 08  
 Studies of fossil fishes during 1907: Dean, 08  
 Surgeon-fish, West Indies: Hussakof, 07  
 Symmorium: Cope, 93i  
 Tamiobatis: Eastman, 97b  
 Teleostomi: Cope, 91d  
 Tertiary: Cope, 78, 84; Green River, Wyo.: Cope, 71a  
 Tetrapoda, origin: Gregory (W K), 15  
 Titanichthys: Claypole, 92e; Newberry, 88b; Ohio: Claypole, 96a; Newberry, 87f  
 Tremataspidae: Patten, 02  
 Triassic: Eastman, 14; Eaton (G F), 03; Redfield,  
 Connecticut: Newberry, 78c  
 Connecticut Valley and New Jersey: Newberry, 88  
 Trinidad, Laventille Hills: Guppy, 79a  
 Virginia: Redfield, 53  
 Bethany: Leidy, 59c  
 Miocene: Cope, 69a  
 Richmond: Wyman, 50c  
 Wyoming: Cope, 77u  
 Bridger beds: Leidy, 73d  
 Embar formation: Branson, 16  
 Eocene: Cope, 85v  
 Green River: Cope, 70h, 71a, 77c  
 Xiphactinus: Hay (O P), 98b; Cretaceous, Kansas: Leidy, 70c; Stewart (A), 99a; variations: Stewart (A), 98a  
 Pisgah folio, N. C.—S. C. (no. 147): Keith, 07a  
 Pit and mound structures: Kindle, 16c  
 Pitchblende: Fleck, 09; Zalinski, 09a; Gilpin Co., Colo.: Rickard (F), 13  
 Pittsburgh coal bed: Burroughs, 14c  
 Pittsfield oil field, Ohio: Burroughs, 13a  
 Pityoxyla: Jeffrey, 06; Clifford, N. J.: Holden (R), 13  
 Placers. *See also* Gold.  
 Alluvial gold: Garrison, 09a  
 California, beach placers: Irvine, 08  
 Canada: Tyrrell, 10d  
 General: Brooks, 13  
 Genesis of gold placers: Dunn, 94a  
 Occurrence of gold in placers: Collins (W F), 09  
 Origin and classification: Smyth (H L), 05  
 Pay streak: Tyrrell, 12a  
 Placerville folio, Cal. (no. 3): Lindgren, 94  
 Placoderms. *See* Pisces.  
 Plagioclases, decimal grouping: Calkins, 17  
 Plains.  
 Canada, northwestern: Dowling, 16  
 Illinois, Joe Daviess Co.: Trowbridge, 13  
 Plan of earth: Gregory (J W), 99  
 Plane table mapping: Higgins, 13; Pelton, 12; Ransome, 12a; Wegemann, 12b  
 Planetesimal hypothesis: Chamberlin (T C), 01a, 15a; bearings on geology: Fairchild, 04c



- Plants, fossil. *See* Palaeobotany.  
 Plateau plains, origin: Keyes, 12g  
 Plateaus of the Colorado: Margerie, 84  
 Platinum.  
   British Columbia, Tulameen district: Camsell, 10, 10c, 13  
   California: Aubury, 06  
   Canada: Denis, 02; Donald, 93; Malcolm, 18  
   General: Blake (W P), 69; Day (D T), 05, 13; Dickson, 05; Hill (J M), 15b; Horton, 06a; Kemp, 02; Lindgren, 11d  
   Nevada, Clark: Bancroft (H C), 10a  
   Goodsprings: Crampton, 16  
   Yellow Pine district, Boss mine: Kennedy, 15  
   Occurrence: Kunz, 18; in North America: Day (D T), 01  
   Oregon: Day (D T), 05; Stafford, 04  
   United States: Day (D T), 05; Patterson, 50; U S G S, 83; distribution: Day (D T), 10  
   Wyoming: Taft, 18  
 Platt, Franklin, biography: Frazer, 01a  
 Platyneras: Keyes, 88c; attachment to crinoids: Keyes, 89  
 Platygonus: Dugès, 87; Kansas: Peterson, 14b; Pliocene, Texas: Gidley, 03a  
 Platygonus compressus: Le Conte (J L), 48  
 Platysomus, Alberta: Lambe, 14b  
 Platystrophia, morphogenesis: Cumings, 03  
 Platystrophia lynx, variation: Cumings, 02  
 Playas and playa lakes: Russell, 83a  
 Pleasant Valley coal district, Utah: Taff, 07a  
 Plectoceras: Whiteaves, 06a  
 Pleistocene. *See* Glacial geology; Quaternary.  
 Pleistocene formations, classification: McGee, 91h  
 Pleistocene glacial formations, genetic classification: Chamberlin (T C), 93c, e, 94b  
 Pleistocene glaciation and the coral reef problem: Daly (R A), 10b  
 Plesiosaurs. *See* Reptilia.  
 Pliocene. *See* Tertiary.  
 Plumalina: Hall, 78  
 Plutonic plugs: Emmons (S F), 99  
 Pocahontas coals: Althouse, 06  
 Pocahontas folio, Va.-W. Va. (no. 26): Campbell (M R), 96a  
 Pocket coal district, Va.: Fisher (C A), 09b  
 Poebrotherium: Leidy, 48a; osteology: Scott (W B), 91b  
 Poetry: Lippincott, 81  
 Point Hope spit, Alaska: Kindle, 09a  
 Polar wanderings: Barrell, 14b  
 Polorthus: Gabb, 72a  
 Polycotylus: Williston, 06a  
 Polycystina, Barbados: Ehrenberg, 46; Schomburgk, 47, 48  
 Polydactyl horses: Marsh, 79d  
 Polyphemopsis: Keyes, 89g  
 Polythalamia, Alabama, Zeuglodon marl: Ehrenberg, 55  
 Polyzoa. *See* Bryozoa.  
 Pontolis: True (F W), 05b  
 Poposaurus gracilis, Triassic, Wyoming: Mehl, 15a  
 Popular and elementary books: Hutchinson, 91; Shaler 89, 92; Vail, 86  
 Popular oil geology: Ziegler, 18  
 Porcupine district. *See* Ontario.  
 Porcupine district, Alaska: Wright (C W), 04a  
 Porcupine Mountains, Mich.: Lane (A C), 09b  
 Porcupine Valley, Alaska: Kindle, 08a  
 Porocystis, Cretaceous, Texas: Jarvis, 05; Rauff, 95  
 Porocystis pruniformis Cragin: Böhm, 12  
 Porosity of oil sands: Shaw (E W), 18c  
 Porphyry: Rickard, 95a  
 Portage stage, New York: Prosser, 93b  
 Portals, ancient: Smith (J P), 12c  
 Port Henry quadrangle, N. Y.: Kemp, 10c  
 Portland Canal district, B. C.: McConnell, 11, 12b; Robertson (W F), 10; Rush, 10; Thomson, 10  
 Portland cement. *See* Cement.  
 Port Leyden quadrangle, N. Y.: Miller (W J), 10  
 Port Orford folio, Oreg. (no. 89): Diller, 03  
 Porto Rico.  
   Coamo-Guyama region: Hodge (E T), 16  
   General: Berkey, 16a; Fenner, 15; Fernández de Castro, 77a; Hill (R T), 98d, 99b  
   San Juan district: Semmes 16  
*Economic geology.*  
   General: Berkey, 15a  
   Iron and copper deposits: Hamilton, 09  
   Limonite deposits, Mayaguez Mesa: Fettke, 18  
   Mineral resources: Domenech, 99; Hill (R T) 99a; Nitze, 99  
   Ore deposits: Henning, 11  
*Historical geology.*  
   Coamo-Guayama region: Hodge (E T), 17  
   General: Berkey, 15a; Reeds, 16a  
   Geologic history: Reeds, 16  
   San Juan district: Semmes, 17  
*Paleontology.*  
   Bats: Anthony, 17a  
   Corals: Vaughan, 02  
   General: Reeds, 16a, 17a  
   Isolobodon: Allen (J A), 16  
   Mammalia: Anthony, 16a, 17b  
   Nesophontidae: Anthony, 16  
   Octodont: Allen (J A), 16  
   Rodentia: Anthony, 17  
   Sirenian: Matthew (W D), 16f  
*Petrology.*  
   General: Berkey, 15a  
*Physical geology.*  
   Changes of level, recent: Mitchell (G J), 18  
*Physiographic geology.*  
   Coamo-Guyama region: Hodge (E T), 16  
   General: Berkey, 15a; Wilson (H M), 00a  
*Underground water.*  
   General: Wilson (H M), 99  
 Port Wells district, Alaska: Johnson (B L), 14  
 Potash. *See also* Alunite.  
   American deposits: Mitchell, 12  
   California: Boalich, 18a  
   Death Valley: Gale, 14a; Anon, 13b  
   Saline Valley: Gale, 14b  
   Searles Lake: Dolbear, 13; Gale, 13b; Hammon, 12, 12a  
   Canada: Malcolm, 18  
   Evaporation of brines: Hicks (W B), 15a  
   Extraction from Wyomingite: Wells, 16  
   Field investigations: Gale, 12a  
   General: Breger, 12; Coolbaugh, 18; Day (W C), 88; Gale, 17; Heriot, 15; Phalen, 11, 17b; Stutzer, 12a  
   Georgia, Cartersville slates: Shearer, 18a; potash-bearing slates: McCallie, 17



**Potash—Continued.**

- Great Basin lakes: Gale, 14  
 Greensand deposits, eastern United States:  
   Ashley, 17a  
 Land classification: Smith (G O), 13  
 Muscovite as source of potash: Steiger, 15  
 Nebraska, northwestern: Ziegler, 15  
 Nevada: Dole, 13; Free, 12a  
   Columbus Marsh: Gale, 14c  
   Railroad Valley: Free, 13; Sheldon (G L), 12  
   Timber Lake: Gale, 13a  
 Occurrence in bitterns: Phalen, 13; Turrentine,  
   13  
 Recovery from tailings: Butler (B S), 15a  
 Saskatchewan: Dowling, 18a  
 Search in Western States: Van Horn (F B), 11  
 Texas: Phillips (W B), 15; Udden, 14a; Spur,  
   Dickens Co.: Udden, 12c  
 United States: Gale, 12a; Phalen, 11b, 15; U S  
   G S, 83  
 Utah, Marysvale: Butler (B S), 12b; Loughlin,  
   15; central: Waggaman, 16  
   Salduro salt deposit: Gale, 16  
 Western United States: Hance, 14; Surr, 12  
 Wyoming, Leucite Hills, Sweetwater Co.:  
   Schultz, 12

**Potholes.**

- California: Turner, 92  
 Connecticut, Gurleyville: Koons, 83  
 General: Bouvé, 89; Elston, 17; Jackson, 50g,  
   51f; Upham, 89b, 00a  
 Indiana, Richmond: Moore (J), 93b  
 Iowa, Johnson Co.: Webster, 88  
 Maine: Manning, 01; Georgetown, Merrill (G  
   P), 04a  
 Massachusetts, Shelburne Falls: Crosby, 87a  
 Minnesota, Taylor's Falls: Upham, 01d  
 New Hampshire, Lost River: Goldthwait, 15b  
 New York: Gilbert, 71  
   Catskill: Hubbard (O P), 89; Osborn, 00d  
   Crown Point: Barker, 13  
   Williamsbridge: Britton (N L), 82a  
 Niagara River: Fleming, 99  
 Ontario, near Lake Superior: McKellar, 90;  
   Rockwood: Pantou, 89  
 Pennsylvania, Archbald: Ashburner, 86f; Dana  
   (J D), 87e  
   Beaver River: Hice, 03  
   Scranton: Eaton (H N), 16  
   Wyoming Valley: Corss, 00a  
 Saint Croix Dalles: Upham, 00a  
 Vermont, Poultney: Nichols, 65

Potomac beds: Fontaine, 89

Potomac flora: Fontaine, 89; Ward (L F), 05

Potomac formation: Berry, 11b; Knowlton, 89a;  
 McGee, 88a, 90a; Marsh, 96e; Ward (L F),  
 95, 96, 96a; age: Gilbert, 96c; Ward (L F),  
 97b; Virginia: Fontaine, 96; wood: Knowl-  
 ton, 89

Potomac group: Clark (W B), 97d, 02b, d; age:  
 Berry, 15c

Potsdam sandstone: Hunt, 52c; Rogers (W D), 61b;  
 Winchell (N H), 82a

Pottsville floras: White (D), 00

Pottsville series, Kentucky: Campbell (M R), 00b;  
 New River: White (D), 95

Pottsville-Allegheny boundary, interior province:  
 White (D), 13c

- Poughkeepsie quadrangle, N. Y.: Gordon (C E), 11  
 Poughkeepsie region, N. Y.: Shattuck, 07b  
 Pound quadrangle, Va.-Ky: Butts, 14  
 Powder River coal field, Wyo.: Stone (R W), 10a  
 Powder River oil field, Wyo.: Wegemann, 12  
 Powell, J. W., biography: Brewer (W H), 02; Dall,  
   05a; Davis (W M), 15d; Dellenbaugh, 18;  
   Gilbert, 02b, 03, 03a; Langley, 02; Merrill  
   (G P), 03a; Walcott, 03a; Anon, 82  
 Powell Mountain coal field, Va.: Campbell (M R),  
   11e

**Prairies.**

Alabama: McGuire, 34

Origin: Atwater (C), 18; Caton, 69; Dana (J D),  
 65; Drummond, 86; Fendler, 66; Gabb,  
 71a; Hay (O P), 78; Leiberg, 89; Lesque-  
 reux, 65; Newberry, 73; Nutt, 32; Shimek,  
 10, 11; Ward (L F), 82; Wells, 19; Win-  
 chell (A), 64b

**Pre-Cambrian.**

Alabama: Hitchcock (C H), 85a

Alaska: Brooks, 07

Alaska-Yukon boundary: Cairnes, 14, 14b

Alberta, Athabasca-Churchill rivers region:  
 Tyrrell, 96

Bow River Valley: Walcott, 08a

Rocky Mountains: Allan, 13

American and European compared: Hicks (H),  
 85

Animikie slates: Winchell (N H), 88c

Appalachians: Keith, 94a; southern: Becker, 95

Archean, divisions: Irving, 85b

Archean greenstones, origin: Winchell (N H),  
 95d

Archean period of North American: Heneage,  
 06; Arctic regions: Bugge, 10; De Rance  
 78; Feilden, 78; McMillan, 10; Ellesmere  
 Land: Høltedahl, 17

Arizona: Ransome, 08b, 16

Bisbee quadrangle: Ransome, 04, 04b

Buckskin Mountains: Blanchard, 13

Clifton quadrangle: Lindgren, 05

Clifton-Morenci district: Lindgren, 05a

Fort Apache region: Reagan, 03b

Globe district: Ransome, 03, 04a

Grand Canyon district: Noble, 14; Walcott,  
 83c, 94, 95a; Shinumo area: Noble, 10

Jerome district: Finlay (J R), 18a

Mohave Co.: Schrader, 08a

northern: Darton, 10a

Ray quadrangle: Ransome, 15b

Salt River valley: Lee (W T), 05

Santa Catalina gneiss: Blake (W P), 08b

Warren district: Bonillas, 16

western: Lee (W T), 08a

Yuma Co.: Bancroft (H), 11

Baffinland: Bell (R), 01a

Belt series: Walcott, 01b

British Columbia: Daly (R A), 12a

Cordilleran formations: Daly (R A), 13a

Cranbrook area: Schofield, 15

Crowsnest and Flathead areas: Rose, 18

East Kootenay: Schofield, 12b, 14

Elko to Kootenay Lake: Schofield, 13

Field area: Allan, 14; Walcott, 11

Finlay and Omenica rivers: McConnell, 96

Golden-Kamloops: Daly (R A), 15

Ice River district: Allan, 12a



## Pre-Cambrian—Continued.

- British Columbia: Kootenay region: Drysdale, 17a  
 Purcell Range: Schofield, 14a  
 Selkirk and Purcell Mountains: Daly (R A), 14a  
 Selkirk Mountains: Burwash, 11; Coleman, 11a; Dawson (G M), 91b  
 Shuswap lakes region: Daly (R A), 12  
 southeastern: Schofield, 14b  
 West Kootanie district: Dawson (G M), 90  
 West Kootenay and Boundary districts: LeRoy, 13  
 Yellow Head Pass region: McEvoy, 00  
 California: Smith (J P), 16  
 Canada: Ami, 00a, 01h; Bell (R), 90b; Bigsby, 64; Billings, 57c; Blake (J F), 85; Coleman, 09d, 10b, 14a; Dawson (G M), 97a; Hicks (H), 85; Hunt, 67d, 84c, 87c, 88; Kinahan (G H), 85; Lawson, 93f; Logan, 53, 57a, b, 63; Macfarlane, 62; Miller (W G), 09; Ramsay, 65; Selwyn, 84; Termier, 13a  
 eastern: Dawson (J W), 88h  
 Hudson Bay region: Bell, 85, 85d; Leith, 10a  
 Laurentian: Adams (F D), 93, 93a, 08a  
 maritime provinces: Matthew (G F), 08a  
 Proterozoic: Coleman, 15  
 Rocky Mountain region: Dawson (G M), 01  
 St. Lawrence Valley: Kindle, 15  
 Timiskaming region: Collins (W H), 13e  
 Canadian shield, Archeozoic: Adams (F D), 15  
 Catoclin belt: Keith, 94a  
 Chengwatona series, Minnesota: Hall (C W), 00  
 Classification: Adams (F D), 15; Coleman, 14a, 15; Credner, 68; Irving, 88; Leith, 14; Miller (W G), 12a; Sederholm, 13b  
 Classification and correlation: Van Hise, 09  
 Classification and nomenclature: Lane, 05i  
 Colorado, Alma district: Patton, 12  
 Boulder district: Fenneman, 05b  
 Breckenridge district: Ransome, 11  
 Castle Rock quadrangle: Richardson (G B), 15  
 central: Peale, 76  
 Central City quadrangle: Bastin, 17  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Costilla Co., Grayback district: Patton, 10a  
 Denver Basin: Emmons (S F), 96  
 Engineer Mountain quadrangle: Cross, 10  
 Georgetown quadrangle: Ball (S H), 06, 08  
 Gold Brick district: Crawford, 16  
 Grand River district: Peale, 77  
 Hahns Peak region, Routt Co.: George (R D), 09c  
 Leadville: Emmons (S F), 82  
 Monarch and Tomichi districts: Crawford (R D) 13  
 north central: Henderson (J), 09  
 northwestern: Gale, 10  
 Ouray quadrangle: Cross, 07a  
 Rabbit Ears region: Grout, 13a  
 Red Cliff region: Means, 15  
 Rico Mountains: Cross, 00  
 Routt Co.: Fenneman, 06b  
 southwestern: Cross, 14a  
 Connecticut: Gregory (H E), 07a

## Pre-Cambrian—Continued.

- Copper-bearing rocks of Lake Superior, age: Irving, 83d  
 Cordilleran region: Lindgren, 15a; Walcott, 99a; forty-ninth parallel: Daly (R A), 13  
 Correlation: Lane, 15, 17; Miller (W G), 14a; Pumpelly, 93a; Van Hise, 93; basis: Adams (F D), 09b  
 Correlation and nomenclature in the St. Lawrence Basin: Wilson (M E), 18a  
 Crystalline stratified rocks: Hunt, 77c  
 Divisions: Hunt, 85a; Lane, 08  
 Eparchean interval: Lawson, 02a  
 Fossiliferous pre-Cambrian: Walcott, 01b  
 Franklin: Low, 06; Hudson Strait: Bell (R), 01  
 General: Credner, 68; Dana (J D), 92; Dawson (J W), 93c, 96a; Frazer, 87c; Holmquist, 09; Hunt, 70b, 73, 77c, 78, 78a, 79, 80c, 81a; 82, 82a, 83, 86; Kemp, 11c; Keyes, 17i; Miller (W G), 11d; Rowe, 11a; Schuchert, 14e, 15c; Tight, 87; Ulrich, 11a; Van Hise, 92, 93, 96, 09a; Walcott, 99a, 01b, 10, 16; Whitney, 84; Winchell (A), 91; Winchell (N H), 00a  
 Georgia, Ellijay quadrangle: LaForge, 13  
 northern: Hopkins (O B), 14; King (F P), 94  
 Glaciation: Knight (C W), 09a  
 Great Lakes region: Lawson, 16; Winchell (A), 89g  
 Greenland: Nordenskjöld, 09  
 Julianehaab region: Ussing, 11  
 northwestern: Heim, 11a  
 Grenville series: Adams (F D), 97  
 Grenville-Hastings unconformity: Miller (W G), 08  
 Hastings series: Adams (F D), 97  
 Huronian system: Bell (R), 89c; Bigsby, 63c; Coleman, 02g; Irving, 87; Selwyn, 89; Winchell (A), 89d, 91a; Winchell (N H), 89g  
 Canada: Whitney, 57  
 Lake Huron: Pumpelly, 92  
 Ontario: Coleman, 00a  
 Idaho: Eldridge, 95  
 Coeur d'Alene district: Ransome, 08; Belt and Pelona series: Hershey, 12b  
 Custer Co.: Umpleby, 13b  
 Mullan: Calkins, 14  
 northern: Calkins, 09  
 St. Joe River basin: Pardee, 11  
 St. Joe-Clearwater region: Calkins, 13a  
 Iowa: Calvin, 06a; Keyes, 93a, 14f, 1; Norton, 12; White (C A), 70  
 Kansas, granite: Powers, 17a  
 Keewatin series: Lawson, 85; distribution, Minnesota: Hall (C W), 99c  
 Keewatin climate and physical conditions: Coleman, 11  
 Keweenaw fault: Lane, 13b  
 Keweenaw series, age: Lane, 12f  
 Keweenaw system: Wadsworth, 87a; Winchell (N H), 95l, m  
 Labrador: Packard (A S), 67; Wilkins, 76a; northeastern: Coleman, 17c; Hind, 77  
 Lake Superior formations, nomenclature: Willmott, 02



## Pre-Cambrian—Continued.

- Lake Superior region: Allen (R C), 15; Brooks (T B), 76a; Collins (W H), 13e; Foster, 51c, e; Geijer, 14; Hunt, 74g; Irving, 76, 83b, c, f, 85c, 87, 88, 90, 92; Lane, 05i; Lawson, 13c; Leith, 05a, 10a, 14; Macco, 04; Selwyn, 83c; Van Hise, 91, 93a, b, 01, 05, 11; Whittlesey, 76; Williams (G H), 93c; Winchell (N H), 95j, n  
 correlation: McKellar, 88  
 eruptives: Winchell (N H), 95o  
 taxonomy: Winchell (N H), 95p  
 Lake Superior stratigraphy: Van Hise, 91a  
 Laurentian: Lane, 12e; Logan, 57b  
   Canada: Adams (F D), 83a, 93a; Logan, 65; Whitney, 57  
   intrusives in, age: Logan, 58a  
   subdivision: Logan, 57b  
   Thousand Islands: Coleman, 92  
 Laurentian-Huronian contact, Ontario: Bell (R), 93a  
 Literature: Leith, 98; current: Van Hise, 93d, 95b  
 Maine: True (N T), 81  
   Androscoggin River headwaters: Huntington, 78  
   northwestern: Hitchcock (C H), 74h  
   Portland region: Hitchcock (C H), 74g  
 Manitoba: Collins (W H), 13d; McInnes, 13a  
   Churchill River region: Alcock, 16  
   Lake Winnipeg region: Dowling, 00a; Moore (E S), 14; Tyrrell, 97a, 00  
   Lake Winnipeg-Burntwood River region: Dowling, 02; Tyrrell, 02  
   Schist Lake district: Bruce, 17, 18a  
   southeastern: Dresser (J A), 17; Marshall, 18; Wallace (R C), 17a  
   Wekusko Lake area: Alcock, 18; Bruce, 17  
   Winnipeg to Malachi: Collins (W H), 13b  
 Maryland: Clark (W B), 97b, 06c  
   Piedmont formations: Mathews, 04, 05  
   Prince Georges Co.: Miller (B L), 11  
   Tolchester quadrangle: Miller (B L), 17  
 Massachusetts: Crosby, 76; Emerson (B K), 17  
   Berkshire Co.: Emerson (B K), 99  
   Diamond Hill-Cumberland district: Warren (C H), 14  
   eastern: Crosby, 80; Hobbs (W E), 99; Hunt, 70a  
   Hampshire area: Emerson (B K), 95b  
   Hampshire Co.: Emerson (B K), 98  
   Newbury: McDaniel, 84  
   southern: Emerson (B K), 95c  
 Mesabi rocks, age: Winchell (N H), 13a  
 Metamorphism of pre-Cambrian schists: Adams (F D), 12a  
 Mexico: Anon, 10; Cañon de Tomellin: Ordóñez, 05f, 06c  
 Michigan: Brooks (T B), 76, 80a; Hore, 15; Lane, 09, 10a; Pumpelly, 71; Wadsworth, 92, 92b; Whittlesey, 60a  
   Black River section: Gordon (W C), 05, 07  
   Crystal Falls district: Clements, 99  
   Gogebic range: Allen (R C), 15a  
   Gwinn iron district: Allen (R C), 14d  
   Iron Mountain: Gresley, 97  
   Iron River district: Allen (R C), 10

## Pre-Cambrian—Continued.

- Michigan: Isle Royale: Lane, 98  
   Keweenaw Point: Hubbard (L L), 94, 98; Irving, 85; Lane, 06  
   Keweenaw region: Lane, 16  
   Keweenaw series: Lane, 11a  
   Lake Superior region: Foster, 51, 51c; Pumpelly, 73b; Van Hise, 93e; Wadsworth, 98a  
   Little Lake district: Allen (R C), 14  
   Marquette district: Shumway, 81; Smyth (H L), 94a; Van Hise, 95, 97; Williams (G H), 90  
   Menominee district: Bayley, 04; Hulst, 93; Rominger, 81a; Smyth (H L), 94a; Williams (G H), 90  
   Penoque region: Irving, 90, 92  
   Pre-Ordovician: Lane, 07  
   Republic district, quartzite: Smyth (H L), 94  
   Republic trough: Smyth (H L), 93, 97  
   Sturgeon River tongue: Bayley, 99  
   Upper Peninsula: Allen (R C), 15; Credner, 69; Rominger, 81, 95; Rose, 04; Wadsworth, 90; copper region: Foster, 50a  
 Minnesota: Emmons (S F), 93; Grout, 14; Hall, 69a; Kloos, 77; Lawson, 00a; Van Barneveld, 12; Winchell (A), 89b; Winchell (N H), 84e, 89b, 93, 00, 00a, 01; Zapffe, 12  
   Animikie: Winchell (A), 88a  
   Animikie slates and Ogishke conglomerate: Winchell (N H), 88c  
   Aitkin Co.: Upham, 99  
   Beltrami Co.: Todd, 99a  
   Benton and Sherburne cos.: Upham, 88  
   Brown and Redwood cos.: Upham, 84  
   Carlton Co.: Winchell (N H), 99a  
   Cook Co.: Grant (U S), 99  
   Crow Wing and Morrison cos.: Upham, 88  
   cupriferous series: Winchell (N H), 82c  
   Cuyuna district: Harder, 17, 17a  
   Cuyuna iron range: Adams (F S), 10; Leith, 07a  
   east central: Harder, 18  
   Grand Portage Island: Grant (U S), 94a  
   iron ranges: Van Barneveld, 12  
   Itasca Co.: Grant (U S), 99  
   Keewatin area: Hall (C W), 01a; volcanic rocks: Grant (U S), 94b  
   Kekequabic Lake region: Grant (U S), 93a  
   Keweenawan: Hall (C W), 01; Lake of the Woods: Winchell (N H), 06  
   Lake Co.: Winchell (N H), 99a  
   Lake Superior region: Whittlesey, 66a  
   Mesabi district: Grant (U S), 98; Leith, 03; Spurr, 94; Winchell (H V), 93, 93b; Winchell (N H), 99a; Wolff (J F), 16  
   Mesabi section: Winchell (N H), 09  
   Mille Lacs and Kanabec cos.: Upham, 88  
   northeastern: Elftman, 94, 98; Grant (U S), 89, 93, 94, 99; Spurr, 94a; Winchell (A), 87, 88; Winchell (A N), 00; Winchell (N H), 88b, 91b, 93e, 97a  
   northern: Winchell (H V), 88, 89, 89a  
   Pigeon Point: Bayley, 93  
   Pine Co.: Upham, 88  
   Rainy Lake region: Winchell (H V), 95, 99  
   Redstone region: Sardeson, 08a  
   Renville Co.: Upham, 88



## Pre-Cambrian—Continued.

- Minnesota: Saganaga granite: Winchell (H V), 91  
 St. Louis Co.: Winchell (N H), 99a  
 southern: Hall (C W), 11a  
 Stearns Co.: Upham, 88  
 Swift and Chippewa cos.: Upham, 88  
 Thomson slates: Spurr, 94e  
 Vermilion district: Abbott (C E), 07; Clements, 02a, 03  
 Wadena and Todd cos.: Upham, 88  
 Yellow Medicine, Lyon and Lincoln cos.: Upham, 84  
 Missouri: Broadhead, 93b; Buckley, 04; Hawthorth, 95; Shepard, 07; Winslow, 95  
 Archean: Broadhead, 82b  
 Iron Mountain sheet: Winslow, 94a  
 Mine la Motte area: Keyes, 95h  
 Ozark Mountains: Keyes, 95g  
 Ozark region: Buehler, 17; Crane (G W), 12  
 Pilot Knob: Pumpelly, 73a  
 southeastern: Buckley, 09; Winslow, 96  
 Montana, Algonkian formations: Walcott, 06  
 Castle Mountain district: Weed, 96a  
 Coeur d'Alene section: MacDonald (D F), 06  
 Dillon quadrangle: Winchell (A N), 14  
 Elkhorn, Jefferson Co.: Weed, 01  
 Elkhorn Mountains: Stone (R W), 11  
 Garrison-Philipsburg fields: Pardee, 17  
 Helena region: Griswold, 98; Knopf, 13; Rothpletz, 15; Walcott, 14  
 Lewis and Livingston ranges; Willis, 02  
 Little Belt Mountains: Weed, 00  
 Little Rocky Mountains: Weed, 96b  
 Maryville district: Barrell, 07  
 northeastern: Collier, 18a  
 northwestern: Calkins, 09  
 Park Co.: Emmons (W H), 08  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Saltese: Calkins, 14  
 southwestern: Douglass, 05a  
 Three Forks region: Haynes, 16a; Peale, 93, 96  
 Nevada: Spurr, 03  
 Esmeralda Co.: Turner, 02  
 Silver Peak quadrangle: Turner, 09  
 New Brunswick: Bailey (L W), 90a, 01a; Credner, 65; Eells, 06c, 08a; Hind, 70d; Matthew (G F), 70, 08  
 northern: Bailey (L W), 87; Eells, 81  
 northern and eastern: Eells, 83  
 Saint John: Eells, 08f; Matthew (W D), 95a  
 southeastern: Eells, 85a  
 southern: Bailey (L W), 72, 77, 79, 80; Matthew (G F), 65c, 79, 92c  
 volcanic rocks: Bailey (L W), 05a  
 western: Bailey (L W), 86  
 New England: Hitchcock (C H), 82  
 Newfoundland: Milne, 77; Murray, 66, 73a, 81; Weston, 96a  
 Avalon Peninsula: Howley, 82  
 Conception and Trinity bays: Van Ingen, 14a  
 southeastern: Dale (N C), 15; Murray, 68a; Algonkian: Buddington, 14  
 Trinity Bay region: Murray, 73  
 White Bay: Howley, 03a

## Pre-Cambrian—Continued.

- New Hampshire: Hitchcock (C H), 72a, 77; True (N T), 81; White Mountains: Hitchcock (C H), 73d  
 New Jersey: Bayley, 10a; Britton (N L), 85b, 87; Cook (G H), 68, 87; Kimmel, 09; Lewis (J V), 15; Spencer (A C), 05a; Wolff, 96, 97  
 Archean: Nason, 89a; Wolff, 94a  
 Franklin Furnace: Spencer (A C), 05f, 08d  
 Hibernia fold: Wolff, 94c  
 Highlands: Fenner, 14; sedimentary rocks: Bayley, 14a  
 Hudson Co.: Russell, 80a  
 Passaic quadrangle: Darton, 08b  
 Raritan quadrangle: Bayley, 14  
 Sussex Co.: Wolff, 98; white limestone: Wolff, 97a  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Keyes, 05b; Lindgren, 10  
 Burro Mountains: Somers, 15  
 Deming quadrangle: Darton, 17  
 Hamilton mine: Lindgren, 06f  
 Jornada del Muerto: Keyes, 05  
 Luna Co.: Darton, 16  
 Silver City quadrangle: Paige, 16  
 New York: Adams (F D), 07; Kemp, 11c, 12c  
 Adirondack Mountains: Alling, 17; Kemp, 99b, 00; Miller (W J), 17a  
 eastern: Kemp, 99  
 north of: Cushing, 99  
 northern: Cushing, 99a, 05a  
 Saranac Lakes region: Cushing, 02  
 southern: Kemp, 99a  
 western: Smyth (C H), 99, 99a  
 Adirondack region: Cushing, 15a; Miller (W J), 13b, 16b; Newland, 08; Smyth (C H), 99b  
 Blue Mountain quadrangle: Miller (W J), 17  
 Broadalbin quadrangle: Miller (W J), 11b  
 Canton quadrangle: Martin (J C), 16  
 Clinton Co.: Cushing, 94, 97, 01  
 Dutchess Co.: Merrill (F J H), 05a  
 Edwards district: Newland, 17a  
 Elizabethtown and Port Henry quadrangles: Kemp, 10c  
 Essex Co.: Kemp, 94, 95, 97; Essex and Willsboro townships: White (T G), 94; Minerva: Finlay (G I), 02a  
 Gouverneur quadrangle: Cushing, 18  
 Herkimer Co., Little Falls: Cushing, 02a  
 Highlands: Berkey, 07  
 Jefferson Co.: Smyth (C H), 94  
 Lake Bonaparte quadrangle: Buddington, 18  
 Lake Placid region: Kemp, 98  
 Lake Pleasant quadrangle: Miller (W J), 16a  
 Little Falls quadrangle: Cushing, 05  
 Long Lake quadrangle: Cushing, 07  
 Manhattan Island: Friedrich, 89b  
 Mohawk Valley: Darton, 97  
 New York City: Berkey, 12, 12a  
 New York district: Merrill (F J H), 02  
 North Creek quadrangle: Miller (W J), 14a  
 northern: Emmons (E), 42; Hall, 76b  
 Ogdensburg region: Cushing, 16  
 Orange Co.: Ries, 97b



## Pre-Cambrian—Continued.

New York: Paradox Lake quadrangle: Ogilvie, 05  
 Port Henry: Hunt, 83d  
 Port Leyden quadrangle: Miller (W J), 10  
 Poughkeepsie quadrangle: Gordon (C E), 10, 11  
 Remsen quadrangle: Miller (W J), 09  
 Richmond Co.: Britton (N L), 81a  
 St. Lawrence Co.: Macfarlane, 65; Smyth (C H), 94, 97a  
 St. Lawrence River region: Smyth (C H), 01  
 Saratoga Springs region: Cushing, 14  
 southeastern: Mather, 43; Merrill (F J H), 90, 98; Smock, 86  
 Thousand Islands region: Cushing, 10a  
 Warren, Saratoga, Fulton, and Montgomery cos.: Kemp, 01  
 New York and adjoining States: Gordon (C E), 09  
 nomenclature: Coleman, 06a; Lane, 15; Leith, 13a; Schuchert, 16c; Sederholm, 13b; Selwyn, 92; Winchell (N H), 01c; Woodworth, 13, 13b  
 Nomenclature and correlation: Van Hise, 05  
 North America: Hunt, 84c; Van Hise, 09a; Willis, 12  
 North Carolina: Emmons (E), 56; Graton, 06a; Kerr, 75; Mitchell, 42; Nitze, 97b  
 Cranberry quadrangle: Keith, 03  
 Dan River field: Stone (R W), 12a  
 Kings Mountain district: Keith, 17  
 Nantahala quadrangle: Keith, 07  
 Pisgah quadrangle: Keith, 07a  
 Roan Mountain quadrangle: Keith, 07b  
 Virgilina district: Laney, 17  
 North Dakota, Devils Lake region: Babcock, 02  
 Northwest: Van Hise, 92c  
 Northwest Territory, Great Slave Lake region: Cameron, 18  
 Hudson Bay region: Tyrrell, 97  
 Tazin and Taltson rivers: Camsell, 16  
 Winisk and upper Attawapiskat rivers region: McInnes, 09a  
 Nova Scotia: Gilpin, 82b; Hind, 70d, e; Knight (O W), 11; Malcolm, 12  
 Antigonish Co.: Honeyman, 86b  
 Cape Breton Island: Fletcher, 78, 85; Gilpin, 86c; Clyburn Valley: Wright (W J), 14b  
 eastern: Faribault, 87; Fletcher, 81, 87  
 gold-bearing series: Faribault, 13  
 Laurentian: Honeyman, 70a; Hunt, 70d  
 Lunenburg Co.: Faribault, 14d  
 Meguma series: Woodman, 08  
 northern: Ells, 85a  
 Queens Co.: Faribault, 14c  
 Shelburne Co.: Powers, 15a  
 Ogishke conglomerate, Minnesota: Grant (U S), 92; Winchell (N H), 88c  
 Oklahoma, Arbuckle Mountains: Reeds, 10; Tishomingo quadrangle: Taff, 03  
 Ontario: Adams (F D), 07; Barlow, 99; Bayfield, 45; Bell (R), 89b; Blue, 96; Chapman (E J), 75; Coleman, 11, 12b; Collins (W H), 13d; Ells, 95b; Logan, 54b; Miller (W G), 08, 11b, 15, 15a; Murray, 57; Tyrrell, 13a, 15b; Winchell (N H), 91b  
 Algoma: Coleman, 99; Bruce mines district: Ingall, 03a, 05; Mississauga: Graton, 03

## Pre-Cambrian—Continued.

Ontario: Algoma and Thunder Bay districts: Wilson (W J), 09  
 Animikie iron range: Silver, 06  
 Antik-Okan region: Hille, 06  
 Beatty-Munro area: Hopkins (P E), 15a  
 Boston Creek area: Burrows (A G), 16, 16b  
 Cobalt district: Hore, 10, 11c, d; Miller (W G), 13, 13a  
 Cobalt series, Timiskaming region: Wilson (M E), 13  
 Cripple Creek area: Bruce, 12a  
 Dryden gold area, district of Kenora: Thomson, 18  
 eastern: Ells, 97, 03d, 04d  
 Espanola district: Quirke, 17  
 French River sheet: Bell (R), 98  
 Galetta: Ami, 94b  
 Gauthier township: Burrows (A G), 17b  
 Goodfish Lake area: Burrows (A G), 16a, b  
 Gowganda and Miller lakes area: Burrows (A G), 09  
 Gowganda district: Collins (W H), 09, 13  
 Gowganda to Porcupine area: McMillan, 12  
 Grenville series: Adams (F D), 08b  
 Grenville-Hastings series: Adams (F D), 97  
 Grenville-Hastings unconformity: Miller (W G) 07a, 08  
 Gunflint district: Trueman, 11  
 Haliburton area: Adams (F D), 98, 99, 00a; Barlow, 97  
 Haliburton-Bancroft area: Adams (F D), 13b  
 Hastings Co.: Chapman (E J), 60e; Wallbridge, 69; Laurentian: Vennor, 68  
 Hunters Island: Smith (W H C), 92a  
 Huronian: Coleman, 00a; north of Lake Superior: Bell (J M), 06  
 Huronian ice age: Coleman, 07c  
 Iron Spur district: Uglow, 13  
 Kingston area: Baker (M B), 16  
 Kingston-Lake Simcoe region: Murray, 54  
 Kirkland Lake and Swastika gold areas: Burrows (A G), 14  
 Kowkash area: Hopkins (P E), 16a, 17  
 Lac Seul region: McInnes, 02  
 Lake Abitibi area: Baker (M B), 09  
 Lake Huron region: Barlow, 90, 92; Bell (R), 92a; Coleman, 14; Collins (W H), 16a; Murray, 57c; Pumpelly, 92  
 Lake Huron-James Bay region: Bell (R), 77  
 Lake Nipigon region: Coleman, 07; Moore (E S), 07; Wilson (A W G), 02  
 Lake Nipigon to Lac Seul: Collins (W H), 06a  
 Lake Nipigon to Lake Abitibi: Burrows, 13a  
 Lake Nipigon-Clay Lake region: Collins (W H), 09a  
 Lake of the Woods, Manitou, and Dryden: Parsons (A L), 11  
 Lake of the Woods region: Bell (R), 83a, Bigsby, 52; Lawson, 85, 89; Parsons (A L), 13, 13a  
 Lake Savant Range area: Moore (E S), 10  
 Lake Simcoe region: Baddeley, 36  
 Lake Superior region: Bell (R), 70a, 72, 73a; Bigsby, 52a; Collins (W H), 09b; Dawson (J W), 57; Hunt, 83e; Lawson, 87b, 90d, 91a, b; Logan, 52c; Macfarlane, 66a, 67; Selwyn, 83d; Winchell (A), 90c



## Pre-Cambrian—Continued.

- Ontario: Lake Timiskaming: Hume, 17; Miller (W G), 05, 05c  
 Lake Wendigokan region: Moore (E S), 09c  
 Larder Lake district: Brock, 07; Wilson (M E), 10, 12  
 Laurentian and Huronian, relations: Barlow, 93a  
 Laurentian system: Miller (W G), 11c  
 Long Lake district: Baker (M B), 17; Burrows (A G), 17  
 Loon Lake district: Parsons (A L), 13a; Smith (W N), 05  
 McArthur township: Hopkins, 12  
 Madoc area: Knight, 13a  
 Malachi to Lake Nipigon: Collins (W H), 12b  
 Matachewan area: Burrows (A G), 18  
 Mattagami basin: Baker (M B), 11, 11a  
 Michipicoten area: Parsons (A L), 15  
 Michipicoten Bay: Tight, 87  
 Michipicoten iron ranges: Coleman, 02c, 06  
 Michipicoten Island: Burwash, 05  
 Michipicoten region: Bell (J M), 05; Willmott, 98  
 Montreal River district: Collins (W H), 09c, 11  
 Moose River basin: Bell (J M), 04; Bell (R), 83; Parks, 00  
 Muskoka Lakes region: Lindsey, 13b  
 Nipigon region: Coleman, 08e; Wilson (A W G), 10  
 Nipissing district: Hore, 10a; Miller (W G), 01  
 Nipissing-Algoma line: Burwash, 97  
 Nipissing-Timiskaming area: Barlow, 99  
 northern: Coleman, 12a; Moore (E S), 12b  
 northwestern: Coleman, 02; Collins (W H), 08a  
 Onaman area: Moore (E S), 08, 09b  
 Onaping area: Collins, 12, 14, 17  
 Ottawa district: Ells, 01  
 Parry Island: Walker (T L), 13  
 Patricia district: Miller (W G), 12; Tyrrell, 13  
 Pembroke sheet: Ells, 07b  
 Porcupine district: Burrows (A G), 11, 12, 13, 15; Flynn, 11; Hore, 11b, e  
 Port Arthur district: Courtis, 87; Parsons (A L), 13a  
 Rainy Lake region: Bigsby, 54; Coleman, 95; Lawson, 87a, 88, 12a, 13d  
 Rainy River district: Parks, 98  
 Red Lake region: Dowling, 96  
 Rideau Lakes: Drummond, 95  
 Round Lake-Abitibi River: Bolton, 03  
 Russell Co., Rockland: Ami, 93a  
 St. Ignace Island: Robb, 82  
 Seine River and Lake Shebandowan areas: McInnes, 99  
 Severn River headwaters: Camsell, 05  
 Severn River region: Low, 87  
 Slate Islands: Parsons (A L), 18  
 southeastern: Miller (W G), 14; Vennor, 70, 72, 73  
 South Lorraine area: Burrows (A G), 09a  
 Steeprock Lake: Lawson, 12; Smyth (H L), 91; Uglow, 13

## Pre-Cambrian—Continued.

- Ontario: Sturgeon Lake district: Moore (E S), 11a  
 Sudbury district: Barlow, 03, 04; Bell (R), 91; Bonney, 88; Coleman, 05, 13, 13f; Collins (W H), 14a; Roberts (H M), 18; Walker (T L), 97; Winchell (N H), 91f  
 Sudbury series: Coleman, 14a  
 Sudbury-Cobalt-Porcupine region: Miller (W G), 13, 13c  
 Swastika area: Bruce, 14  
 Temagami area: Miller (W G), 13  
 Thessalon area: Knight (C W), 15  
 Thunder Bay district: Bowen (N L), 11; Ingall, 92; Lawson, 90c  
 Timagami district: Barlow, 04a  
 Timiskaming district: Baker (M B), 17; correlation: Collins (W H), 13c; Huronian: Collins (W H), 14b  
 Toronto region: Coleman, 13j  
 upper lakes region: Coleman, 99  
 Vermilion Lake district: Moore (E S), 11b  
 Victoria Co.: Merritt, 82  
 Victoria, Peterborough and Hastings cos.: Adams (F D), 94  
 west of Lake Superior: Smith (W H C), 93  
 western: Brent, 03; Coleman, 96, 97, 98; Murray, 58; Huronian clastics: Coleman, 98b  
 West Shiningtree district: Stewart (R B), 12, 13a  
 Whiskey Lake area: Coleman, 13a  
 Pennsylvania: Lesley, 92; Rogers (H D), 58  
 Chester Co., Doe Run-Avondale region: Bliss (E F), 16  
 Coatesville quadrangle: Bliss (E F), 14  
 Delaware Co.: Rand, 87  
 Durham Hills: Peck, 11  
 eastern: Jonas, 17; sedimentary rocks: Wherry, 18a  
 Lancaster Co.: Frazer, 80  
 Lehigh and Northampton cos.: Peck, 08  
 Lehigh region: Miller (B L), 11b, 14  
 Mercersburg-Chambersburg district: Stose, 09  
 Philadelphia Co.: Hall (C E), 81  
 Philadelphia district: Bascom, 04, 09a; Hitchcock (C H), 84b  
 Piedmont district: Bascom, 05, 15; Mathews, 05  
 southeastern: Frazer, 82; Hunt, 78  
 South Mountain: Eaton (H N), 12  
 Trenton quadrangle: Bascom, 09b  
 York Co.: Frazer, 86a  
 Primeval continent: Gratacap, 81  
 Problem of: Van Hise, 08  
 Quebec: Barlow, 06a; Bayfield, 45; Dresser, 06c; Ells, 97d, 98a, d; Miller (W G), 08; Selwyn, 79b; Winchell (N H), 95i  
 Abitibi district: Wilson (W J), 10  
 area north of Montreal: Adams (F D), 96a  
 asbestos district: Harvie, 13  
 Beauce Co.: Tyrrell, 15  
 Belcher Islands, Hudson Bay: Moore (E S), 18  
 Bell River region: Wilson (M E), 14  
 Broadback River region: Cooke (H C), 14  
 Buckingham area: Wilson (M E), 14a, 16



## Pre-Cambrian—Continued.

Quebec: Chibougamau region: Barlow, 11, 11a; Dulieux, 10  
 Coleraine area: Knox, 18  
 eastern townships: Dresser, 02c, 10d; Ells, 87a, 88  
 Fabre Township: Harvie, 11  
 Gaspé district: Mailhiot, 11  
 Gaspé Peninsula: Ells, 85; Low, 85; Richardson (J), 58  
 Grenville region: Logan, 57, 59; Wilson (M E), 17, 17a  
 Grenville sheet: Ells, 01a  
 Haliburton and Bancroft areas: Adams (F D), 10d  
 Harricanaw region: Bancroft (J A), 13a  
 Hudson Bay region: Bell (R), 85b  
 Keekeek and Kewagama region: Bancroft (J A), 12a  
 Kewagama Lake area: Wilson (M E), 12a, 13c  
 Labrador Peninsula: Low, 96a, 98  
 Lake St. John district: Dresser, 16, 16b; Richardson (J), 72  
 Lake Timiskaming area: Wilson (M E), 10a  
 Larder Lake district: Wilson (M E), 10  
 Laurentian: Adams (F D), 95  
 Laurentian area north of Montreal: Adams (F D), 92b  
 Laurentian highlands: Wilson (M E), 13b  
 Laurentian series: Logan, 60b  
 Mistassini region: Low, 85a  
 Montreal district: Adams (F D), 96; Ami, 04a; Ells, 96  
 Montreal-Quebec region: Logan, 54  
 Murray Bay: Dawson (J W), 61b  
 New Quebec territory: Denis, 13  
 Nipissing-Timiskaming area: Barlow, 99  
 Northern Transcontinental Railway, Hervey Junction-Doucet: Bancroft (J A), 17  
 northwestern: Wilson (M E), 11  
 Nottaway River region: Bell (R), 02  
 Opasatica district: Harvie, 11b  
 Orford area: Harvie, 12  
 Ottawa district: Ells, 93a, 01  
 Ottawa Valley: Osann, 02; Stansfield, 12, 13  
 Pembroke sheet: Ells, 07b  
 Pontiac and Ottawa cos.: Keele, 17  
 Pontiac Co.: Thomson, 18; Wilson (M E), 12  
 Portneuf Co.: Bancroft (J A), 16  
 Portneuf, Quebec, and Montmorency cos.: Low, 92a  
 Saguenay region: Laflamme, 85  
 St. Francis Valley: Dresser, 06  
 St. Lawrence, north shore region: Richardson (J), 70a  
 southern: Dresser, 12b; Harvie, 14  
 Three Rivers sheet: Ells, 00  
 Timiskaming Co.: Wilson (M E), 18  
 Ungava region: Low, 99a  
 western: Vennor, 78  
 Random terrane, Newfoundland: Walcott, 00  
 Rhode Island: Emerson (B K), 07, 17; Diamond Hill-Cumberland district: Warren (C H), 14  
 Rocky Mountain region: Hunt, 77d  
 Saskatchewan: McInnes, 13a  
 Amisk Lake district: Bruce, 18

## Pre-Cambrian—Continued.

Saskatchewan: Lac La Ronge district: McInnes, 10  
 northern: Bruce, 16a  
 Sioux quartzite, Iowa: Beyer, 97; Keyes, 14l; age: Keyes, 95r  
 South Carolina: Graton, 06a; Sloan, 07, 08; Pisgah quadrangle: Keith, 07a  
 South Dakota: Darton, 09a; Todd, 98  
 Aberdeen-Redfield district: Todd, 09a  
 Black Hills: Claypole, 92b; Crosby, 88a; Darton, 09; Hall (C W), 91; Paige, 13; Van Hise, 90; Harney granite: Ferguson (H G), 08; northern: Irving, 99  
 De Smet quadrangle: Todd, 04a  
 Harney Peak district: Duncan, 12  
 Huron quadrangle: Todd, 04  
 James River Valley: Todd, 04b  
 Lincoln Co.: Bendrat, 04  
 southeastern: Todd, 00  
 Steep Rock series: Rothpletz, 15  
 Taconic: Winchell (N H), 88e  
 Tennessee: Safford, 69; Ducktown district: Emmons (W H), 11b  
 Texas: Dumble, 90  
 Black and Grand prairies: Hill (R T), 01  
 central: Comstock, 90  
 central mineral region: Comstock, 91  
 El Paso quadrangle: Richardson (G B), 09  
 Llano Co.: Paige 10  
 Llano and Burnet quadrangles: Paige, 12  
 Llano-Burnet region: Paige, 11  
 trans-Pecos: Richardson (G B), 04  
 Van Horn quadrangle: Richardson (G B), 14  
 Time-table: Schuchert, 14e  
 Unconformities: Sederholm, 13  
 Utah, Cottonwood-American Fork region: Butler (B S), 15  
 northeastern: White (C A), 89  
 Promontory district: Butler (B S), 16  
 Uinta Range: Weeks, 07  
 Wasatch Mountains: Blackwelder, 10a; Hintze, 13  
 Vermont: Dale (T N), 16; Hitchcock (E), 61; Richardson (C H), 06; Whittle, 94  
 Bennington: Gordon (C E), 14  
 Green Mountains: Dana (J D), 72b  
 Hardwick: Richardson (C H), 14a  
 Newport, Troy, and Coventry: Richardson (C H), 08  
 Orange Co.: Richardson (C H), 02  
 unconformity: Keith, 14  
 Woodbury: Richardson (C H), 14a  
 Virginia: Hitchcock (C H), 82  
 James River basin: Taber (S), 13  
 Monticello area: Lambeth, 01  
 Virgilina district: Laney, 17  
 Volcanic rocks in Huronian: Dawson (G M), 94b; in the Keewatin: Selwyn, 94  
 Wisconsin: Brooks (T B), 76; Chamberlin (T C), 83; Hall, 62j; Irving, 80b; Weidman, 15; Whittlesey, 60a  
 Baraboo district: Weidman, 04  
 Baraboo Valley: Eaton (J H), 74  
 Douglas Co.: Grant (U S), 00  
 Dodge Co.: Irving, 73  
 Fox River valley: Weidman, 98



## Pre-Cambrian—Continued.

- Wisconsin: Huronian series: Irving, 79  
 Lake Superior district: Grant (U S), 01;  
 Irving, 80a; Sweet, 80; Thwaites, 12  
 Menominee iron region: Brooks (T B), 80;  
 Wright (C E), 80a  
 north central: Weidman, 07a  
 northern: Allen (R C), 15; Irving, 74, 74a, 80;  
 Thomas (K), 00; Sweet, 76a  
 northwestern: Hotchkiss, 15  
 Penoque iron range: Irving, 78, 90; Wright  
 (C E), 80  
 Penoque series: Irving, 92  
 St. Croix district: Strong, 80; Wooster, 84  
 Sauk Co.: Eaton (J H), 73; Irving, 72; quart-  
 zite: Chamberlin (T C), 74, 74a  
 southeastern: Alden, 18  
 Waterloo quartzite: Warner, 05  
 Wyoming, Big Horn Basin: Fisher, 06  
 Big Horn Mountains: Darton, 06e  
 Black Hills region: Darton, 09  
 Encampment district: Spencer (A C), 04  
 Fremont Co.: Jamison, 11  
 Laramie and Sherman quadrangles: Darton,  
 10c  
 Medicine Bow Range: Blackwelder, 18c  
 northwestern: Eldridge, 94a  
 Owl Creek Mountains: Darton, 06  
 southeastern: Blackwelder, 08  
 Yellowstone National Park: Weed, 96  
 Yukon, international boundary: Cairnes, 14  
 Klondike district: Bell (R), 10  
 Lewes and Nordenskiöld rivers district:  
 Cairnes, 10a  
 Precious stones. *See also* Gems; Diamonds; Sap-  
 phires; Turquoise.  
 British Columbia, Yaled istrict: Camsell, 10b  
 California: Kunz, 05; Martin (A H), 10d; San  
 Diego Co.: Cowan, 10; Lestrangle, 10  
 Canada: Kunz, 88  
 General: Kunz, 83, 95; Schaller, 16d; Sterrett,  
 07d  
 Georgia: McCallie, 10  
 Idaho: Bell (R N), 07b  
 in drift: Muilenburg, 14  
 Maine: Bastin, 11  
 Mexico, Lower California: Wittich, 16a  
 North Carolina: Pratt, 08a, 11a  
 Alexander Co.: Hidden, 87c  
 emeralds: Sterrett, 12a  
 Occurences in North America: Gardiner, 11  
 Opal in Nevada and Idaho: Kunz, 12  
 Pacific Coast States: Maguire, 00  
 United States: Kunz, 01; Sterrett, 12; U S G S,  
 83  
 Utah, variscite: Pepperberg (L J), 11  
 Preglacial valleys of Mississippi and tributaries:  
 Clem, 11  
 Prehistoric man and beast: Hutchinson, 97  
 Pre-Pleistocene gravels, Mississippi basin: Salis-  
 bury, 92b  
 Pressure in formation of rocks and minerals; John-  
 ston (J), 15  
 Pribilof Islands: Stanley-Brown, 92  
 Priest Lake district, Idaho: Courtis, 06a; Lancaster,  
 10  
 Primary geology, elements: Hunt, 87c

Primates. *See* Mammalia.

- Primeval earth, chemical conditions; Hunt, 58b  
 Primeval life: Dawson (J W), 97  
 Primordial sandstone, Rocky Mountains: Hayden,  
 62a  
 Prince Edward Island.  
 General: Bain (F), 90; Dawson (J W), 71; Wat-  
 son (L W), 02  
*Economic geology.*  
 Coal possibilities: Poole, 05  
*Historical geology.*  
 General: Bain (F), 85; Dawson (J W), 55, 71,  
 72b; Ells, 85, 03b; Watson (L W), 02  
 Northumberland Strait: Ells, 94a  
 Permian: Bain (F), 93; Case, 05d  
 Permian moraine: Bain (F), 87  
 Permo-Carboniferous: Bain (F), 80; Watson  
 (L W), 12  
 Triassic; Bain (F), 85b  
*Mineralogy.*  
 Saponite: Harrington, 74a  
*Paleontology.*  
 Bathygnathus: Leidy, 54, 81  
 Coniferous wood: Dawson (J W), 54b  
 General: Dawson (J W), 55  
 Permo-Carboniferous: Bain (F), 80  
 Plants: Bain (F), 85; Holden (R), 13a  
*Physiographic geology.*  
 General: Dawson (J W), 72d  
 Surface geology: Chalmers, 94, 95  
 Princeton petroleum field, Ind.: Blatchley (R S),  
 07  
 Prince William Sound, Alaska: Grant (U S), 06c,  
 10b  
 Prismatic sandstone: Haworth, 92a  
 Problematic organisms.  
 Archaeozoon: Matthew (G F), 07b  
 Arthropycus and Daedalus, burrow origin:  
 Sarle, 05  
 Beatricea: Grant (C C), 90; Knott, 85  
 Carboniferous, Washington Co., Ohio: Karpin-  
 skii, 09a  
 Cryptozoan frequens: Walcott, 06  
 Dactyloidites, Washington Co., N. Y.: Hall, 86b  
 Daemonelix: Barbour, 97; distribution: Bar-  
 bour, 03a; origin: Petersen, 05a  
 Devonian, Falls of the Ohio: Knowlton, 89b  
 General: Dawson (J W), 97b; James (J F), 90f,  
 92b  
 Gyrichnites, Gaspé: Whiteaves, 83a  
 Porocystis Cragin: Jarvis, 05  
 Protichnites and Climactichnites: Chapman  
 (E J), 77  
 Rectogloma: Van Tuyl, 14  
 Scolithus: James (J F), 92c, d; Potsdam sand-  
 stone: Perry, 71a  
 Seaweeds (?), Fayette Co., Ind.: White (D), 03c  
 Solenopora: Nicholson, 88  
 Solenopora compacta: Nicholson, 85a  
 Proboscidea. *See* Mammalia.  
 Procamelus: Douglass, 09  
 Proceratops: Lull, 06  
 Prodromites: Smith (J P), 01  
 Productus: Norwood, 55  
 Promerycochoerus, Nebraska: Peterson, 14d  
 Propodial, embryonic: Moodie, 11c  
 Prorosmarus: Berry, 06e



**Prosser, C. S.**, biography: Clarke (J M), 16a; Cumings, 17

**Protaster:** Parks, 08a, 09

**Protiehnites**, Potsdam sandstone, N. Y.: Marsh, 69

**Protoceras:** Scott (W B), 95e; Miocene: Osborn, 92a

**Protoceratidae:** Marsh, 97b

**Protolenus fauna:** Matthew (G F), 95h

**Protopalaeaster narrowayi:** Hudson (G H), 12a, 13a; covering plates: Raymond (P E), 12c

**Protore:** Ransome, 13b

**Protostega:** Case, 97a; Wieland, 98, 06, 06a, 09; Williston, 02e

**Protozoa.** *See also* Foraminifera; Invertebrata.

Barbados, Polyceystinae: Ehrenberg, 76

California: Friedrich, 89c

Cerionites: Calvin, 93a

Cincinnati: James (J F), 87

Cryptozoon: Seely, 08a

Cyloerinus: Roemer, 88

Dietyophyton: Roemer, 83; Whitfield, 81d, e

Eocene, Virginia: Bagg, 95

Foraminiferal ooze, Coal Measures, Iowa: Udden, 03a; Texas: Udden, 03a

Fusulina, Ohio: Verneuil, 46

Fusulina cylindrica, occurrence: Owen (D D), 52e

Fusulinas, nomenclature: Girty, 14

Kansas, chalk: Patrick, 83

Maryland Pleistocene: Clark (W B), 06b

Paseolus: Roemer, 88

Pre-Cambrian: Matthew (G F), 95g

Protoeyathus, New York: Ford (S W), 78

Radiolaria, Manitoba, Pierre formation: Rüst, 92

Radiolarians, early: Matthew (G F), 95g

Trochiliscus, Ohio: Karpinskii, 09

**Protractor:** Penfield, 00f; geological: Wright (F E), 16

**Pseudo-cols:** Chamberlin, 94f

**Pseudomorphs.**

After halite, Jamaica: Hovey, 97a

After spodumene: Brush, 80a

Calaite (turquoise) after apatite: Moore (G E), 85

Calcite after salt: Emerson, 95a

Chalcocite, copper after: Hunt (J H), 90

Chlorite after garnet, Lake Superior: Pumpelly, 75

Copper, Lake Superior: Alger, 61a

Copper after azurite: Yeates, 89

Corundum: Graham (R P D), 06

Development: Patton, 03

Feldspar after leucite (?), Magnet Cove, Ark.: Kunz, 86l

Garnet: Penfield, 86b

General: Dana (J D), 45, 72a, 74, 74c, 75f; Hunt, 72b

Glauberite casts: Wherry, 16g

Gummite and uranotile after uraninite: Foote (A E), 80

Idaho, Shoshone: Rowe, 04a

Laumontite: Graham (R P D), 06

Leadhillite: Foote (W M), 95

Limonite after calcite: Haworth, 92

Limonite after diabantite: Emerson, 16a

Limonite after marcasite: North, 13

## Pseudomorphs—Continued.

Limonite after pyrite: Meem, 86; Smith (E G), 86; Lancaster Co., Pa.: Willig, 18

Magnetite after hematite, Antwerp, N. Y.: Moses, 92

Magnetite after pyrite: Hoffmann, 87

Malachite after azurite, Bisbee, Ariz.: Hills, 91a

Massachusetts, Hampden Co.: Roe, 06

Mimetosite, Durango, Mex.: Rath, 86a

Nesquehonite after landfordite: Genth, 90a

New Jersey, Franklin, after anorthite: Roep-per, 78

New York: Beck, 32; northern: Smyth (C H), 97b

Nontronite after wollastonite: Bergeat, 09a

Pectolite, silica and prehnite after: Hunt (J H), 90

Pectolite after quartz, Paterson, N. J.: Glenn (M L), 17

Pyrite replacing quartz: Smyth (C H), 05a

Pyrrhotite, New York: Smyth, 11

Quartz: Hidden, 86f; Moses, 95; Steenstrup, 10

Rutile after brookite, Arkansas: Rath, 77

Rutile after ilmenite: Williams (G H), 87g

Serpentine after dolomite: Lewis (H C), 82c

Serpentine after olivine: Emerson, 95a

Serpentine pseudomorphs, N. Y.: Dana (J D), 74c

Silver: Navia, 74

Spodumene, Massachusetts: Julien, 79

Stibnite, San Luis Potosi: Ford (W E), 12a

Tremolite, Connecticut: Hobbs, 92a

Wolframite after scheelite, Connecticut: Warren (C H), 01

**Pseudostratification:** Louderback 12

**Psittacotherium:** Wortman 96a

**Psymphyllum majus:** Arber 12

**Pteranodon:** Eaton (G F), 03a, 08, 10; Marsh, 76d, h, 84c; Matthew (W D), 16b; Williston, 91

**Pterodactyl.** *See* Reptilia.

**Pteropoda.**

Camerotheca, St. John group: Matthew (G F), 85b

Conularia, Hamilton, Ontario: Anon, 79; sessile, New York: Ruedemann 96, 98

Diplothea, St. John group: Matthew (G F) 85d

Hyalithes, Port Jervis, N. Y.: Barrett, 76a

Hyalithellus: Billings, 71b

Paleozoic: Walcott, 85b

Stenothea acadica, St. John group: Matthew (G F), 86a

**Pterosauria:** Huene, 14a

**Ptilodus:** Gidley, 09

**Ptilophyton:** Dawson (J W), 82c

**Ptychodus:** Leidy, 68h

**Public lands, classification:** Smith (G O), 13d

**Pueblo folio, Colo. (no. 36):** Gilbert, 97

**Puerto Hills oil district, Cal.:** Eldridge, 07

**Puerco, relations to Laramie:** Cope, 85u

**Puerco fauna:** Cope, 83n

**Puget group:** White (C A), 88c; Willis, 97

**Pumieite, Nebraska:** Barbour, 16a

**Purdue, A. H., biography:** Ashley, 18b; Glenn, 1c

**Pyramid Peak folio, Cal. (no. 31):** Lindgren, 96a

**Pyrgulifera:** White (C A), 85e



**Pyrite.**

- Alleghany Mountains: Wendt, 86  
 California: Aubury, 06  
   Leona Heights deposit: Mace, 11  
   Leona rhyolite: Clark (C W), 17  
   Plumas Co.: Bradley, 13  
 Canada: Wilson (A W G), 12, 12a  
 Colorado, Leadville: Lee (H S), 18  
 Decomposition: Julien, 86  
 General: Davis (H J), 86; Martyn, 85; Phalen, 08e; Rothwell, 87; Smith (P S), 18  
 Georgia: McCallie, 10; Shearer, 18  
 Maine: Emmons (W H), 10a  
 Massachusetts: Rutledge, 06  
 Newfoundland, Port au Port: Meissner, 02  
 New Hampshire: Emmons (W H), 10a  
 New York, Edwards district: Newland, 17a  
   Jefferson and St. Lawrence cos.: Buddington, 17  
   northern: McDonald (P B), 13; Mills (F S), 08; Newland, 17b  
   Peekskill district: Loveman, 11  
   St. Lawrence Co.: Smyth (C H), 12  
 North Carolina: Winslow, 86  
 Occurrence in bituminous coal: Brown (A P), 88  
 Ontario: Fraleck, 07  
   Lake Nipigon-Clay Lake region: Collins (W H), 09a  
   Queensboro area: Knight, 13a  
   southeastern: Hopkins (P E), 16  
   Sturgeon Lake district: Moore (E S), 11b  
 Origin: Willmott, 07a  
 Oxidation: Winchell (A N), 07  
 Pennsylvania coals: Leighton (H), 18; new source of sulphur supply: Chance, 08e  
 Quebec, Haliburton and Bancroft areas: Adams (F D), 10d  
 South Carolina: Sloan, 08; Kershaw: Watkins, 18  
 Tennessee: Ashley, 10b; Ducktown: Taylor (J H), 18  
 Texas, Llano and Burnet quadrangles: Paige, 12  
 United States: Nason, 06; Rothwell, 87; U S G 8, 83  
 Virginia: Fontaine, 82c; Watson, 07e, 10f

**Pyrophyllite.**

- British Columbia, Kyuquot Sound: Clapp (C H), 15  
 North Carolina: Hafer, 13; Pratt, 00

**Pyrophyllitization, Conception Bay, Newfoundland: Buddington, 16****Pyrrhotite.**

- New York, Jefferson and St Lawrence cos. Buddington, 17  
 Tennessee, Ducktown: Taylor (J H), 18  
 Virginia: Watson, 07e; southwestern: Van Mater, 18  
 Wisconsin, origin: Bagg, 13

**Pyroxene, titaniferous: Winchell (A N), 03****Pythonomorpha: Merriam (J C), 94****Quadra Island, B. C.: Cairnes, 14e****Quapaw district, Okla.: Crane, 07****Quartz. See also Silica.**

- General: Fuller, 98b; Ries, 97a, 01  
 Maine: Bastin, 07, 11

**Quartz—Continued.**

- New York, southeastern: Bastin, 07a  
 Pennsylvania, Frankstown: Holland, 12  
 Recent formation: Hunt, 80e  
 South Carolina: Sloan, 08

**Quartz, cavities in: Atlee, 38****Quartz as a geologic thermometer: Wright (F E), 09a****Quartzite.**

- Classification and origin: Cayeux, 07  
 General: Crosby, 88d  
 Montana: Rowe, 08  
 Origin: Rutley, 94

**Quaternary. See also Glacial geology.**

- Alabama: Tuomey, 58  
   Coastal Plain: Smith (E A), 94  
 Alaska: Brooks (A H), 07; Tarr, 06e, 12  
   Alaska Peninsula: Atwood, 11  
   Anvik-Andreafski region: Harrington, 18  
   Bonnifield region: Capps, 12  
   central Quaternary history: Eakin, 17b  
   Chitina Valley: Moffit, 18  
   Controller Bay region: Martin (G C), 08  
   Copper River region: Mendenhall, 05  
   Fortymile quadrangle: Prindle, 09  
   Hanagita-Bremner region: Moffit, 14  
   Iliamna region: Martin (G C), 12a  
   Mount McKinley region: Brooks (A H), 11  
   Mount St. Elias region: Maddren, 14a  
   Nabesna-White River district: Capps, 10a  
   Nizina district: Moffit, 11a  
   Noatak-Kobuk region: Smith (P S), 13a  
   northern: Schrader, 04  
   Pleistocene: Maddren, 05  
   Rocky Mountains: Schrader, 02  
   southwestern: Spurr, 00  
   Tolovana district: Mertie, 17  
   Turnagain Arm region: Moffit, 06  
   Upper Yukon region: Brooks (A H), 08a  
   Willow Creek district: Capps, 15b  
   Yentna district: Capps, 13  
   Yukon-Koyukuk region: Eakin, 16  
 Alberta: Chalmers, 06, 06a  
 Arizona: Merrill (F J H), 06a  
   Bisbee quadrangle: Ransome, 04, 04b  
   Bradshaw Mountains quadrangle: Jagger, 05  
   Buckskin Mountains: Blanchard, 13  
   Clifton quadrangle: Lindgren, 05  
   Clifton-Morenci district: Lindgren, 05a  
   Globe district: Ransome, 03, 04a  
   Navajo country: Gregory (H E), 17  
   Salt River valley: Lee (W T), 05  
   Sulphur Spring Valley: Meinzer 13  
   western: Lee (W T), 08a  
 Arkansas: Veatch (A C), 06e  
   Crowley's Ridge: Call, 91; Salisbury, 91a  
   northeastern: Stephenson, 16a  
   southwestern: Hill (R T), 88  
 Atlantic Coastal Plain: Clark (W B), 09a; Darton, 95a; McGee, 91b; Pugh, 05; Shattuck, 01; Vanuxem, 29a  
 Attitude of United States: Chamberlin (T C), 91b  
 Base-leveling, Minnesota and Manitoba: Upham, 94m  
 Brandywine formation, Atlantic Coastal Plain: Clark (W B), 15a



## Quaternary—Continued.

- British Columbia: Chalmers, 06a  
 climatic changes: Brock, 10  
 coast region: Bancroft (J A), 13  
 East Kootenay district: Schofield, 14  
 Nanaimo area: Clapp (C H), 14  
 New Westminster and Nanaimo districts:  
   LeRoy, 08  
 Savona: Drysdale, 16  
 Vancouver Island: Clapp (C H), 13b, 14b  
 California: Arnold, 06, 09a; Comstock, 02a; Fur-  
   long, 06; Smith (J P), 10, 16  
 Coalinga district: Arnold, 08g  
 Coast Ranges: Osmont, 05; southern: Fair-  
   banks, 98  
 Colfax quadrangle: Lindgren, 00  
 Colorado Desert: Orcutt, 90  
 eastern: Ball (S H), 07; Fairbanks, 96c; Spurr,  
   03  
 Inyo Range: Knopf, 18  
 Inyo and White Mountains: Knopf, 14a  
 Jackson quadrangle: Turner, 94  
 Neocene deposits of Kern River: Anderson  
   (F M), 11  
 McKittrick-Sunset district: Johnson (H R),  
   09  
 Marysville quadrangle, Lindgren, 95  
 Mohave Desert region: Baker (C L), 11;  
   Buwalda, 14; Merriam (J C), 15g; Pack,  
   14a  
 Mohawk Valley: Turner, 91a  
 Mono Valley: Russell, 89  
 Placerville quadrangle: Lindgren, 94  
 Point Reyes Peninsula: Anderson (F M), 99  
 Rancho La Brea deposits: Merriam (J C), 08c  
 Redding quadrangle: Diller, 06  
 Sacramento quadrangle: Lindgren, 94a  
 San Francisco district: Lawson, 14  
 San Luis quadrangle: Fairbanks, 04  
 Santa Barbara Co., Point Sal: Fairbanks, 96a  
 Santa Clara Valley: Eldridge, 07  
 Santa Cruz Mountains: Arnold, 08d; Neocene:  
   Ashley, 96  
 Santa Cruz quadrangle: Branner, 09b  
 Santa Maria district: Arnold, 07d, f  
 Sierra Nevada: Turner, 96  
 southeastern: Loew, 76  
 southern: Hershey, 02f; Hilgard, 88; Pleisto-  
   cene: Arnold (D), 02  
 Taylorsville region: Diller, 08b  
 Truckee quadrangle: Lindgren, 97  
 Yosemite Valley region, Pleistocene: Turner,  
   00a  
 Canada: Ami, 00a, 01h  
 Classification: Heilprin, 87c  
 Climate in glacial and postglacial time: Knowl-  
   ton, 10  
 Climatic changes: Hay (O P), 10  
   in Canadian maritime provinces: Matthew  
   (G F), 10  
   postglacial: Dall, 10  
   since glacial period in northwestern Canada:  
   Tyrrell, 10  
 Climatic conditions: Alden, 10  
 Climatic variations in St. Lawrence Valley:  
   Adams (F D), 10c  
 Colorado, Alma district: Patton, 12

## Quaternary—Continued.

- Colorado, Apishapa quadrangle: Stose, 12  
 Arkansas Valley: Darton, 06f  
 Clear Creek region: Underhill (J), 06  
 Denver Basin: Cannon, 89, 95b; Emmons  
   (S F), 96  
 Engineer Mountain quadrangle: Cross, 10  
 Georgetown quadrangle: Ball (S H), 08  
 Hahns Peak region, Routt Co.: George (R D),  
   09c  
 Leadville quadrangle: Capps 09; Emmons  
   (S F), 82  
 Nepesta quadrangle: Fisher (C A), 06a  
 North Park: Beckly, 15  
 Ouray quadrangle: Cross, 07a  
 Perry Park: Cannon, 91a  
 Sangre de Cristo Range: Siebenthal, 07  
 San Juan Mountains: Howe, 06  
 San Luis Valley: Siebenthal, 10a  
 Columbia formation: Darton, 93c; McGee, 88a,  
   f, 91f; Chesapeake Bay, head: McGee, 88  
 Connecticut: Gregory (H E), 06b; Gulliver, 07a;  
   Brewsters Neck: Gulliver, 06  
 Continental movements: McGee, 91g  
 Correlation of Cenozoic: Osborn, 10a  
 Cuba, eastern, Pleistocene: Vanatta, 12; Habana  
   y Guanabacoa: Salterain y Legarra, 80  
 Delaware: Chester (F D), 84b, 85  
   Dover quadrangle: Miller (B L), 06  
   Philadelphia district: Bascom, 09a  
 Delaware Valley: Cresson, 89  
 District of Columbia: Darton, 01  
 Divisions: Upham, 94g, 97  
 Driftless Area, Upper Mississippi Valley: Cham-  
   berlin (T C), 85a; Salisbury, 91b; Trow-  
   bridge, 15  
 Duration: Upham, 97  
 Equus beds, Kansas: Haworth, 97b; Hay (O P),  
   17e  
 Extinct lakes: Shaw (E W), 15  
 Florida: Matson, 09b, 13a; Smith (E A), 81a  
   phosphate districts: Matson, 15  
   southern: Sanford, 09  
   Vero: Berry, 17h; Chamberlin (R T), 17, 17a;  
   Hay (O P), 17b; Sellards, 17c; Vaughan,  
   17c  
   western: Dall, 94  
 General: Babbitt, 09; Cope, 87c; Daly (R A),  
   11; Geikie (J), 85; Hay (O P), 12b;  
   Hitchcock (C H), 88a; Le Conte, 77;  
   Osborn, 10a, 15b; Upham, 97  
 Georgia: McCallie, 10; Spencer (J W), 90f;  
   Veatch (J O), 09  
   Coastal Plain: Brantley, 16; Stephenson,  
   15a; Veatch (J O), 11a  
   southwestern: Dall, 94  
 Great Lakes, history: Taylor (F B), 07  
 Greenland: Böggild, 17  
 Greenland, Labrador, and Baffin Land: Bar-  
   ton, 96  
 Gulf region: Hilgard, 71a  
 Idaho, Boise quadrangle: Lindgren, 98  
   Cœur d'Alene district: Ransome, 08  
   eastern: Hershey, 12  
 Nampa quadrangle: Lindgren, 04  
 southeastern: Schultz, 18



## Quaternary—Continued.

Illinois: Worthen, 85; Fowke, 06; Weller, 06a  
 Belleville and Breese quadrangles: Udden, 15  
 Columbia formation: Hershey, 95  
 Evanston-Waukegan region: Atwood, 08a  
 northwestern: Carman, 09; Hershey, 93  
 Peoria quadrangle: Udden, 12  
 St. Louis quadrangle: Fenneman, 11  
 Starved Rock State Park: Cady, 18  
 surface deposits along the Mississippi: Fowke, 08  
 Tallula and Springfield quadrangles; Shaw (E W), 13a  
 Indiana: Blatchley (W S), 06a; Hay (O P), 12; Leverett, 07a  
 Jackson Co.: Cresson, 89a  
 Monroe Co.: Reagan, 04  
 Tippecanoe Co.: McBeth, 05  
 Inferior boundary: Hershey, 97e  
 Iowa: Calvin, 06a; Gordon (C H), 92; Norton, 12; Orr, 07  
 Blackhawk Co.: Arey, 06  
 Bremer Co.: Norton, 06  
 Clayton Co.: Leonard, 06  
 Chickasaw Co.: Calvin, 03a  
 Davenport: Pratt (W H), 76  
 Davis Co.: Arey, 10c  
 Des Moines, Capitol Hill, Pleistocene: Lees, 16a  
 eastern: Carman, 09  
 Fayette Co.: Finch (G E), 06  
 Franklin Co.: Williams, 06  
 Howard Co.: Calvin, 03  
 Jackson Co.: Savage, 06a  
 loess: Shimek, 90  
 Mitchell Co.: Calvin, 03b  
 Sac and Ida cos.: MacBride, 06  
 Simpson College well: Tilton, 10  
 Winneshiek Co.: Calvin, 06  
 Kansas: Hay (R), 93a; Mudge, 75b, 78; St. John, 83c  
 Equus beds: Haworth, 97b; Hay (O P), 17e  
 Fort Riley Reservation: Hay (R), 96  
 Independence quadrangle: Schrader, 08b  
 Pleistocene: Williston, 98c  
 southeastern: Broadhead, 79c  
 southwestern: Hay (R), 90  
 Spring River deposits: Hershey, 96  
 Kentucky: Glenn, 06; Owen (D D), 56  
 Blue Grass region: Matson, 09  
 Jefferson Co.: Butts, 15  
 Mississippi Bluffs, Pleistocene: Berry, 15b  
 Shawneetown quadrangle: Lee (W), 16  
 western: Loughridge, 88  
 Lafayette period: Upham, 94g, 97  
 Lake Bonneville: Gilbert, 90  
 Lake Lahontan, age, mammalian evidence: Merriam (J C), 18  
 Laurentian: James (J F), 90  
 Louisiana: Harris, 99a, 02a; Hilgard, 69, 69b, 73; Hopkins (F V), 70, 71, 72; Veatch (A C), 06e, g  
 iron districts: Johnson (L C), 88  
 Lafayette beds: Harris, 08a  
 lower: Hilgard, 69a  
 northwestern: Vaughan, 95  
 southern: Harris, 04a

## Quaternary—Continued.

Maine: Clapp (F G), 06a, 07d  
 Portland region: Hitchcock (C H), 74g  
 Rockland quadrangle: Bastin, 08a  
 Manitoba: Chalmers, 06  
 Maryland: Chester (F D), 84b; Clark (W B), 97b, 06c; Darton, 94g; Shattuck, 06  
 Calvert Co.: Shattuck, 07  
 Chesapeake Bay, head: McGee, 88  
 Choptank quadrangle: Miller (B L), 12  
 Dover quadrangle: Miller (B L), 06  
 McHenry formation: Uhler, 98  
 Nomini quadrangle: Darton, 96a  
 Pleistocene: Shattuck, 02b  
 Prince Georges Co.: Miller (B L), 11  
 St. Marys Co.: Shattuck, 06a, 07a  
 southern: Clark (W B), 91b  
 Tolchester quadrangle: Miller (B L), 17  
 Massachusetts: Clapp (F G), 06a; Fuller, 06h  
 Boston area: Shimer, 15, 18  
 Cape Cod: Allorge, 06; Fuller, 06g; Julien, 07c; Wilson (J H), 06  
 central: Alden, 08  
 Chelsea, post-Pliocene: Stimpson, 51  
 Hampshire Co.: Emerson, 98  
 Nantucket Island: Scudder 75b; Verrill, 75; Wilson (J H), 06; Sankaty Head: Cushman, 06; Merrill (F J H), 96; post-Pliocene: Scudder, 76d; Pleistocene: Wilson (J H), 05, 07; Third Cliff: Bowman (I), 06  
 Mexico: Burkart, 68; Merrill (F J H), 06a  
 Chiapas and Tabasco: Böse, 05; Sapper, 94c  
 Durango: Angermann, 07a  
 Jalisco: Bárcena, 91  
 Lower California: Heim, 15; Wittich, 09; Todos Santos Bay: Lindgren, 89  
 Michigan: Cooper (W F), 07; Lane, 09a; Russell, 06b  
 Ann Arbor: Wooldridge, 88a  
 Arenac Co.: Gregory (W M), 12  
 Bay Co.: Cooper (W F), 06  
 Minnesota, Redstone region: Sardeson, 08a; Saint Anthony Falls: Sardeson, 08  
 Mississippi: Brown (C S), 07; Crider, 06b; Harper, 57; Hilgard, 60, 66; Lowe, 15; northern: Mabry, 98  
 Mississippi Valley: Tight, 07; Salisbury, 91a; Upham, 07; lower: Little, 82  
 Mississippi basin, lakes: Shaw (E W), 11c  
 Missouri: Fowke, 06; Swallow, 55a, 58a; Todd, 96a  
 Bevier sheet: Gordon (C H), 93  
 Higginsville sheet, Lafayette Co.: Winslow, 92  
 Joplin district: Smith (W S T), 07a  
 northern: Hawn, 55  
 St. Louis region: Drushel, 08; Fenneman, 11  
 southwestern: Broadhead, 79c  
 surface deposits along the Mississippi: Fowke, 08  
 Missouri River: Todd, 14  
 Montana, Big Horn Mountains: Darton, 06e; Salisbury, 06b  
 eastern: Rowe, 16  
 Great Falls region: Fisher (C A), 09, 09a  
 Lewis and Livingston ranges: Willis, 02  
 Lewistown field: Calvert, 09a  
 Livingston quadrangle: Iddings, 94



## Quaternary—Continued.

- Montana: northeastern: Collier, 18a  
 Philipsburg quadrangle: Calkins, 15  
 western: Hershey, 12
- Nebraska: Condra, 06a  
 Cass Co.: Woodruff, 06  
 Elk Point quadrangle: Todd, 08  
 loess near Florence: Shimek, 08  
 northeastern: Condra, 08  
 Republican River valley: Condra, 07  
 volcanic deposits: Todd, 86
- Nevada: Spurr, 03  
 Big Smoky Valley: Meinzer, 17  
 Carson area: Reid (J A), 11  
 Esmeralda Co.: Turner, 02  
 Lake Lahontan: Russell, 83, 85  
 Reese River basin: Waring (G A), 18  
 Silver Peak quadrangle: Turner, 09  
 southwestern: Ball (S H), 07  
 Walker River region: Smith (D T), 04
- New Brunswick: Ells, 08a; Stead, 03  
 Bathurst district: Young, 11a  
 Fredericton: Reed (W T L), 85  
 Torryburn Valley: Matthew (G F), 83b
- Newfoundland ice center: Wilson (J H), 08
- New Hampshire: Clapp (F G), 06a; Hanover quadrangle: Hitchcock (C H), 08
- New Jersey: Kummel, 04; Lewis (J V), 15; Salisbury, 17  
 Camden Co.: Pilsbry, 97  
 Franklin Furnace quadrangle: Salisbury, 08  
 Passaic quadrangle: Darton, 08b  
 Philadelphia district: Bascom, 09a  
 southern: Salisbury, 01  
 Trenton gravel: Lewis (H C), 80n  
 Trenton quadrangle: Bascom, 09b  
 Warren Co.: Leidy, 45
- New Mexico: Lindgren, 10  
 Deming quadrangle: Darton, 17  
 Luna Co.: Darton, 16  
 Navajo country: Gregory (H E), 17
- New York, Clyde: Hall, 46a  
 Gardiner's Island: Smith (S), 65  
 Hudson Valley: Merrill (F J H), 91  
 Long Island: Bryson, 88; Fuller, 14  
 Saratoga Springs: McGuier, 69  
 Staten Island: Britton (N L), 89b; Hollick, 99g
- Nicaragua, northeastern: Hershey, 12a
- Nonglaciaded regions: Huntington, 07
- North Carolina: Burbank, 74; Kerr, 75  
 Coastal Plain: Clark (W B), 12; Stephenson, 12a  
 terraces: Johnson (B L), 07
- North Dakota: Leonard, 17; south central: Leonard, 12b
- Northwest Territories: Chalmers, 06
- Ohio, Columbus quadrangle: Hubbard (G D), 15
- Oklahoma, Grandfield district: Munn, 14; Tishomingo quadrangle: Taff, 03
- Ontario, climatic changes: Coleman, 10  
 Espanola district: Quirke, 17  
 Mattagami Valley: Kerr, 06  
 Muskoka lakes region: Lindsey, 13  
 Michipicoten area: Coleman, 06  
 Nipigon region: Coleman, 08e

## Quaternary—Continued.

- Ontario: Onaman ranges: Moore (E S), 08  
 Sudbury nickel field: Coleman, 05  
 Toronto: Coleman, 13e
- Oregon: McCornack, 06  
 Columbia River gorge region: Williams (I A), 16a  
 Coos Bay quadrangle: Diller, 01  
 John Day Basin: Merriam, 01a  
 northwestern: Diller, 96  
 Satsop formation: Bretz, 17  
 southern: Russell, 84
- Ozarkian epoch: Hershey, 97e; Le Conte, 99; McGee, 96a
- Panama: Hershey, 01d
- Panama Canal Zone: MacDonald (D F), 13f
- Paleogeographic map: Willis, 09
- Parallelism with Europe: Desor, 51d
- Pennsylvania, Beaver quadrangle: Woolsey, 05  
 Burgettstown and Carnegie quadrangles: Shaw (E W), 11d  
 Elders Ridge quadrangle: Stone (R W), 05a  
 Foxburg and Clarion quadrangles: Shaw (E W), 11e  
 Johnstown quadrangle: Phalen, 10  
 Kittanning quadrangle: Butts, 04, 06a  
 Philadelphia district: Bascom, 09a; Lewis (H C), 80e, 83b; Smith (A H), 86  
 Port Kennedy: Mercer, 99  
 Rogersville quadrangle: Clapp (F G), 07b  
 Rural Valley quadrangle: Butts, 05a, 06a  
 Sewickley quadrangle: Munn, 11  
 southeastern, Bryn Mawr gravel: Lewis (H C), 80f  
 Trenton quadrangle: Bascom, 09b  
 Waynesburg quadrangle: Stone (R W), 05  
 Wyoming Valley: Darton, 14
- Period divisions: Upham, 94g
- Pleistocene, Mississippi Valley: Chamberlin (T C), 91
- Pleistocene geography: McGee, 92d
- Pleistocene physical geography: Salisbury, 09
- Post-Pliocene, Southern States: Desor, 52
- Potomac Valley: McGee, 89
- Quaternary lakes, Great Basin: Gilbert, 85a
- Quebec, Anticosti, Pleistocene: Grant (C E), 86  
 Kewagama Lake area: Wilson (M E), 13c  
 Montreal district: Ami, 04a; Dawson (J W), 57a; Logan, 46b
- Orford and Sutton mountains: Wilson (A W G), 06a
- St. Lawrence Valley, post-Pliocene: Dawson (J W), 59c
- Rhode Island: Fuller, 06h
- Saskatchewan, Cypress Hills-Wood Mountain region: McConnell, 85  
 Wood Mountain-Willowbunch area: Rose, 16
- Satsop formation, Oregon and Washington: Bretz, 17
- Sierran: Hershey, 02
- South Carolina: Pugh 05; Sloan, 07, 08; post-Pliocene: Holmes (F S), 60
- South Dakota: Todd, 95, 06a  
 Aberdeen-Redfield district: Todd, 09  
 Belle Fourche quadrangle: Darton, 09e



## Quaternary—Continued.

- South Dakota: Black Hills: Darton, 01a  
 Edgemont quadrangle: Darton, 04a  
 Elk Point quadrangle: Todd, 08  
 Lincoln Co.: Bendrat, 04  
 Surface deposits along the Mississippi: Fowke, 08  
 Tennessee: Glenn, 06; Safford, 56, 69  
 Perry Co.: Wade (B), 14  
 western: Nelson (W A), 11  
 Texas: Dumble, 90, 94; Udden, 16a  
 Brazos Co.: Kennedy, 93  
 Coastal Plain: Deussen, 14  
 Dallas Co.: Shuler, 18  
 eastern: Johnson (L C), 88; Kennedy, 92  
 El Paso quadrangle: Richardson (G B), 09  
 Grimes Co.: Kennedy, 93  
 Houston Co.: Kennedy, 92a  
 Lasalle and McMullen cos.: Deussen, 16  
 Llano Estacado: Cummins, 92a  
 northeastern: Gordon (C H), 11  
 Panhandle: Gould, 06  
 Robertson Co.: Kennedy, 93  
 southwestern: Dumble, 03  
 trans-Pecos: Richardson (G B), 04  
 Uvalde quadrangle: Vaughan, 00  
 Val Verde Co.: Roberts (J R), 18  
 Van Horn quadrangle: Richardson (G B), 14  
 Wichita region: Gordon (C H), 13  
 Trenton gravel, New Jersey: Lewis (H C), 80n  
 Utah: Engelmann (H), 58a  
 Castle Valley: Lupton, 16a  
 Lake Bonneville: Talmage, 02  
 Park City district: Boutwell, 12  
 southern: Leith, 08a  
 Tintic district: Tower, 99  
 Vermont: Fairchild, 16  
 Virginia: Clark (W B), 06d; Darton, 94g  
 Coastal Plain: Clark (W B), 12b  
 Nomini quadrangle: Darton, 96a  
 Norfolk quadrangle: Darton, 02  
 St. Marys quadrangle: Shattuck, 06a  
 Washington, eastern: Hershey, 12  
 Ellensburg quadrangle: Smith (G O), 03  
 Mount Stuart quadrangle: Smith (G O), 04  
 Olympic Peninsula: Arnold, 06a  
 Puget Sound region: Bretz, 13  
 Quincy Valley: Schwennesen, 18a  
 Satsop formation: Bretz, 17  
 Snoqualmie quadrangle: Smith (G O), 06b  
 Tacoma quadrangle: Willis, 99  
 Western lakes: Newberry, 71d  
 Wisconsin, Dunn Co.: Hussakof, 16c  
 Wyoming, Bald Mountain and Dayton quadrangles: Darton, 06c; Salisbury, 06  
 Big Horn Basin: Fisher (C A), 06  
 Laramie and Sherman quadrangles: Darton, 10c  
 Newcastle quadrangle: Darton, 04  
 Park Co.: Moody, 18  
 Sundance quadrangle: Darton, 05a  
 western: Blackwelder, 15; Comstock, 74; Schultz, 18  
 Yukon, Klondike gold fields: McConnell, 00  
 postglacial climatic changes: McConnell, 10  
 Wheaton district: Cairnes, 12  
 Quaternary lakes, Great Basin: Gilbert, 85a; Mississippi Valley: Shaw (E W), 11c

## Quebec.

- Anticosti: Combes, 96  
 Beloeil Mountain: Dawson (J W), 77c; Hunt, 69a  
 Berthier, Maskinongé and St. Maurice cos.; Giroux, 93  
 Broadback River region: Cooke (H C), 14  
 Buckingham area: Wilson (M E), 15  
 Champlain and Portneuf cos.: Low, 92  
 Chelsea: Ami, 02d  
 Climatic changes since glacial period: Dresser, 10  
 Covey Hill, upper marine limit: Goldthwait, 13c  
 Eastern townships: Ells, 90a; Mailhiot, 15  
 Explorations along National Transcontinental Railway: O'Sullivan, 08; Wilson (W J), 08  
 Gaspé: Clarke (J M), 08d  
 General: Clarke (J M), 14; Ingall, 31, 31a  
 Geological reconnaissance: Dresser, 09  
 Harricanaw and Nottaway rivers region: Bancroft (J A), 12  
 Harricanaw basin: Bancroft (J A), 13a; Tanton, 15  
 Hudson Bay region: Low, 88, 99, 00, 02  
 Hudson Strait region: Low, 98a, 99a  
 Hudson Strait and Bay region: Bell (R), 85c  
 James Bay region: Low, 88  
 Labelle and Wright cos.: Haycock, 06  
 Labrador Peninsula: Low, 96a, 97, 97a, 98; Valiquette, 09  
 Lake Abitibi region: Wilson (W J), 06a  
 Lake Chibougamau region: Dulieux, 09, 10  
 Lake Mistassini region: Low, 93  
 Lake Opasatika and the Height of Land: Wilson, 09  
 Lake St. John district: Chambers, 89; Dresser, 16, 16a; Low, 91; McOuat, 72  
 Lake Timiskaming region: Bell (R), 89; Wilson (M E), 08  
 Larder Lake district: Wilson (M E), 10  
 Laurentian Highlands: Laflamme, 09  
 Magdalen Islands: Baddeley, 33; Richardson (J), 81  
 Malbaie-Tadousac region: Laflamme, 92  
 Malbay: Bigsby, 22a  
 Manicouagan region: Low, 96  
 Mistassini region: Low, 85a, 90  
 Montreal: Ami, 97b  
 Nastapoka Islands, Hudson Bay: Low, 03  
 National Transcontinental Railway route: Wilson (W J), 10  
 New Quebec: Denis, 13  
 Northern Que.: Low, 95  
 Northwestern Que.: Cooke (H C), 15, 17a; Wilson (M E), 11; Broadback and Nottaway rivers: Cooke (H C), 16  
 Notre Dame and Shickshock Mountains: Laflamme, 09  
 Nottaway River region: Bell (R), 96, 97, 97b, 02  
 Opasatika district: Harvie, 11, 11b  
 Ottawa and Argenteuil cos.: Ells, 93  
 Ottawa and Pontiac cos.: Ells, 94  
 Pontiac Co.: Ells, 96a  
 Saguenay: Dumais, 00  
 Saguenay Co.: Baddeley, 29a  
 St. Bruno Mountain: Dresser, 06e



## Quebec—Continued.

St. Jerome region: Victorin, 13  
 St. Lawrence, north shore: Bayfield, 37, 40  
 St. Maurice district, eastern townships: Adams (F D), 90  
 St. Maurice River region: Giroux, 94  
 St. Paul's Bay region: Baddeley, 31  
 Soils, Ottawa area: Johnston (W A), 17  
 Southwestern Que.: Ells, 92, 99  
 Thetford-Black Lake area: Harvie, 16, 17  
 Timiskaming-Abitibi region: McOuat, 73  
 Ungava Bay: Low, 99a  
 Ungava district, Labrador: Turner, 88

*Economic geology.*

Alluvial gold fields: Gray, 10  
 Amherst graphite deposits: Cirkel, 11a  
 Antimony: Hitchcock, 64  
 Apatite: Adams (F D), 84; Bell (R), 85e; Brown (G C), 85; Falding, 86; Hunt, 84, 86c; Shutt, 87  
 Buckingham, Ottawa Co.: Kinahan (G H), 86  
 Grenville sheet: Ells, 01a  
 Ottawa Co.: Harrington (B J), 79; Torrance, 85; Vennor, 78  
 Ottawa district: Dawkins, 84; Ells, 95d; Kinahan (G A), 85; Osann, 02; Stansfield, 12  
 Asbestos: Cirkel, 03, 05a, 10, 10a; Donald, 90a; Dresser, 09b; Ells, 90c, 91a, 03; Harvie, 13; Stokes (R), 07c; Woolsey, 10  
 eastern townships: Dresser, 10d; Ells, 87a  
 depth: Cirkel, 10b  
 origin: Barlow, 10  
 southeastern Que.: Dresser, 05b  
 southern Que.: Dresser, 13, 14  
 Thetford district: Ells, 89; Gratacap, 00c; Rider, 10; Woolsey, 14  
 Thetford-Danville: Woolsey, 13  
 Belcher Islands, Hudson Bay: Moore (E S), 18  
 Buckingham area: Wilson (M E), 14a, 16, 17b  
 Building and ornamental stones: Parks, 13a, 14a  
 Chibougamau region: Barlow, 11, 11a; Dulieux, 10; Hardman, 05a; Low, 06a; Obalski, 05, 06  
 Chrome iron deposits: Cirkel, 09a; Obalski, 96, 98; Strangways, 08  
 Chromite: Dresser (J A), 17a; Edwards (W H), 06; Glenn, 96; Megantic Co.: Donald, 99  
 Chrysotile asbestos: Cirkel, 10  
 Clay: Keele, 14a, 15; Ries, 12b; Cote St. Luc, Montreal: Donald, 84a  
 Coal-like substance, Point Levis: Anderson (W J), 66  
 Coleraine sheet: Knox, 18  
 Copper: Douglas, 10; Dresser, 06b, 09d; Ells, 04c; Jackson, 63; Williams (H), 65  
 Acton: Kemp, 60; Logan, 61a; Macfarlane, 62a  
 Capelton deposits: Thompson (A P), 13  
 Chibougamau region: Dulieux, 10; Low, 06a  
 eastern townships: Bancroft (J A), 14, 15; Dresser, 01a, 02b, 03, 04, 07  
 Haliburton and Bancroft areas: Adams (F D), 10d  
 Harvey Hill: Douglas, 71  
 Lake Megantic: Dresser, 04a  
 Opasatika Lake district: Cirkel, 09c  
 Sherbrooke district: Dresser, 05a  
 southeastern Que.: Dresser, 07  
 southern Que.: Dresser, 10c

## Quebec—Continued.

*Economic geology—Continued.*

Copper: Weedon, Wolf Co.: Adams, (L D), 16  
 Copper-bearing rocks, Quebec group: Can G S, 66  
 Eastern townships: Chalmers, 97; Ells, 87a, 88, 89b, 90c, 91; Logan, 50  
 Gaspé Peninsula: Richardson (J), 59  
 General: Ells, 90; Parks (W A), 14a  
 Gold: Baddeley, 35; Bell (R), 65; Chalmers, 01a; Douglas, 64; Gray, 10; Hunt, 63a; Logan, 64; Selwyn, 72a  
 alluvial deposits: Cirkel, 11  
 Beauce Co.: Laflamme, 85a; Tyrrell, 15  
 Chaudière district: Baddeley, 35a; Ells, 89; Hunt, 66; Keele, 12b; Logan, 52, 52a; Michel, 66; Wagner, 64  
 Chibougamau region: Dulieux, 10; Low, 06a  
 eastern townships: Chalmers, 97, 97a, 98; Ells, 87a, 96c; Obalski, 08  
 Gilbert River field: Dresser, 05  
 Haliburton and Bancroft areas: Adams (F D), 10d  
 Kewagama Lake area: Wilson (M E), 13c  
 Larder Lake district: Wilson (M E), 10  
 Lake Megantic: Dresser, 08, b  
 Opasatika district: Harvie, 11, 11b  
 Pontiac Co.: Wilson (M E), 12  
 southeastern Que.: Chalmers, 98  
 Gold-bearing districts: Chalmers, 96  
 Graphite: Brumell, 07, 09; Cirkel, 07a; Cole, 98; Ells, 04a; Lamb, 08  
 Amherst: Cirkel, 11a, 12  
 Argenteuil and Labelle cos.: Hille, 08  
 Buckingham and Grenville: Osann, 02  
 Buckingham district: Harrington (W H), 80; Wilson (M E), 14a  
 Dominion mine: Stansfield, 13  
 Haliburton and Bancroft areas: Adams (F D), 10d  
 Laurentian rocks: Dawson (J W), 70e  
 Ottawa Valley: Stansfield, 12; Vennor, 78  
 Walker mine: Stansfield, 13  
 Granite, eastern Que.: Mailhot, 14  
 Grenville region: Ells, 01a; Logan, 57, 59  
 Gypsum, Magdalen Islands: Clarke (J M), 11b  
 Iron: Billings, 57c; Cirkel, 09; Dewey, 84; Dulieux, 12, 12a, 13b, 16; Harrington (B J), 80  
 Belcher Islands, Hudson Bay: Moore (E S), 18  
 bog ore, Lac la Tortue: Harrington (B J), 88  
 Chibougamau region: Dulieux, 10; Low, 06a  
 chrome ore: Cirkel, 09a  
 Haliburton and Bancroft areas: Adams (F D), 10d; Barlow, 8  
 Keekeek and Kewagama lakes region: Bancroft (J A), 12a  
 Larder Lake district: Wilson (M E), 10  
 Nastapoka Islands: Low, 03; Mickle, 02  
 north of the St. Lawrence: Dulieux, 12, 12a  
 northwestern Que.: Bancroft (J A), 12a  
 Ottawa and Gatineau rivers: Cirkel, 09  
 Ottawa Valley: Cirkel, 07  
 Pontiac Co., Bristol mine: Lindeman, 10a  
 Saguenay Co., Natashkwan: Mackenzie, 12  
 St. Lawrence, titaniferous ores: Dulieux, 12b



## Quebec—Continued.

*Economic geology—Continued.*

- Kaolin: Keele, 18a; Amherst Township, Labelle Co.: Wilson (M E), 17a; St. Remi: Keele, 18a
- Kewagama Lake area: Wilson (M E), 13c
- Labrador Peninsula: Low, 96a
- Lake St. John district: Dresser, 16
- Lead: Denis, 12a; Uglow, 16, 16a
- Haliburton and Bancroft areas: Adams (F D), 10d
- Lemieux, Gaspé Co.: Mailhiot, 18
- Portneuf Co.: Bancroft (J A), 16
- Limestones: Rouillard, 17; Philipsburg: Donald, 02
- Magnesite, Grenville district: Fréchette, 11; Wilson (M E), 17, 17a, c
- Magnetic iron sands, Natashkwan, Saguenay Co.: Mackenzie, 12; St. Lawrence River: Obalski, 01a
- marble, Haliburton and Bancroft areas: Adams (F D), 10d
- Marl: Ells, 02a
- Mica: Cirkel, 04; Corkill, 05a; Denis, 12a; De Schmid, 11, 12b, 13a; Ells, 04b; Merritt, 95
- Grenville sheet: Ells, 01a
- Haliburton and Bancroft areas: Adams (F D), 10d
- Nellis mine, Cantley: Stansfield, 13
- Ottawa district: Ells, 94c; Stansfield, 12
- Saguenay region: Obalski, 94
- Mineral resources: Denis, 10, 11; Obalski, 90, 99, 99a, 01, 02; Que, Comm Crown Lands, 76
- Mining operations: Denis, 10, 11; Dufresne, 16; Obalski, 01, 02
- Molybdenite, Pontiac Co.: Thomson, 18
- Quyón district: Camsell, 17a; Wilson (M E), 18b
- Turn Back Lake: Swezey, 13
- Molybdenum deposits: Walker (T L), 11, 11a
- Montreal area: Ells, 96
- Natural gas: Laflamme, 89a; Malcolm, 15; St. Hyacinthe Co.: Dresser, 10b
- Nickel, Orford: Eustis, 79
- Nickeliferous pyrrhotite at Malachite Point: Muscovici, 06
- Nipissing-Timiskaming area: Barlow, 99
- Northern Que.: Obalski, 07a
- Northern Transcontinental Railway, Hervey Junction-Doucet: Bancroft (J A), 17
- Oil shales in Gaspé: Ells, 10c
- Opasatika Lake district: Cirkel, 09b
- Ottawa Co.: Harrington (B J), 79
- Ottawa district, mineral resources: Ells, 99b, 01, 01b; Stansfield, 13
- Ottawa River region: Logan, 47
- Peat: Anrep, 14
- Petroleum, Gaspé: Brumell, 93b; Ells, 03c; Hunt, 65a
- Phosphate: Falding, 86; Small, 93
- Phosphate and feldspar deposits: De Schmid, 12a, 13
- Pontiac and Ottawa cos.: Ells, 95; Keele, 17
- Pontiac Co.: Wilson (M E), 12
- Portneuf, Quebec, and Montmorency cos.: Low, 92a
- Portneuf Co., Montauban region: Bancroft (J A), 16

## Quebec—Continued.

*Economic geology—Continued.*

- Rare earths: Nagant, 06; Obalski, 06a
- Renfrew, Pontiac, and Ottawa cos.: Vennor, 78
- Road materials: Reinecke, 16a, 17, 17a
- Two Mountains and Argenteuil cos.: Gauthier, 17
- Soulanges and Vaudreuil cos.: Picher, 17
- Vaudreuil Co.: Picher, 18
- Saguenay Co.: Baddeley, 29a
- Saguenay region: Laflamme, 85
- St. Lawrence River, region south of: Logan, 49
- Serpentine and asbestos, origin, Black Lake-Thetford area: Graham, 17
- Serpentine belt: Dresser, 08, 09c, 10c, d; Knox, 18
- Shale: Keele, 15
- Sherbrooke district: Dresser, 05a
- Slate: Dresser, 10b, 11
- Southern Que.: Dresser, 13
- Talc: Dresser, 09c
- Haliburton and Bancroft areas: Adams (F D), 10d
- southern Que.: Dresser, 10c
- Templeton district: Ledoux, 16
- Thetford-Black Lake area: Harvie, 16, 17; (Cole-raine sheet): Knox, 17, 18
- Three Rivers sheet: Ells, 00
- Timiskaming Co.: Wilson (M E), 18
- Titaniferous ores and magnetic sands, St. Lawrence: Dulieux, 12b
- Zinc: Uglow, 16
- Lemieux, Gaspé Co.: Mailhiot, 18
- Portneuf Co.: Bancroft (J A), 16
- Historical geology.*
- Acton district: Kemp, 60
- Algal limestone, Belcher Islands: Moore (E S), 18
- Anticosti Island: Laflamme, 02; Richardson (J), 57; Schmitt, 04; Shaler, 62; Twenhofel, 14
- Marl Lake: Grant (C C), 92b
- Ordovician-Silurian section: Schuchert, 10d
- Silurian: Chapman (E J), 57
- asbestos deposits: Harvie, 13
- Auriferous deposits, southeastern Que.: Chalmers, 98
- Beauce Co.: Tyrrell, 15
- Beauharnois region: Logan, 52a
- Belcher Islands, Hudson Bay: Moore (E S), 13
- Bell River region: Wilson (M E), 14
- Beloil and Rougemont Mountains: O'Neill, 12
- Black Cape Silurian section: Clarke (J M), 13d
- Black Lake area, Megantic Co.: Poitevin, 18
- Bonaventure River: Murray, 46
- Broadback River region: Cooke (H C), 14
- Brome and Missisquoi cos.: Harvie, 15
- Brome Mountain, Monteregian Hills: Dresser, 04b
- Buckingham area: Wilson (M E), 14a, 16, 17b
- Cambrian: Marcou, 61a, c
- Charlevoix and Montmorency cos.: Laflamme, 93
- Charlevoix Co.: Laflamme, 91
- Chazy formation: Raymond (P E), 06, 16b; Aylmer: Sowter, 88
- Chibougamau, region: Barlow, 11a, b, c
- Classification of geologic formations: Marcou, 89, 90; Selwyn, 89a



## Quebec—Continued.

*Historical geology—Continued.*

- Cobalt series, Timiskaming region: Wilson (M E), 13
- Coleraine sheet: Knox, 18
- Copper-bearing rocks, eastern townships: Dresser, 02b, 04
- Côte St. Pierre: Bonney, 95; Dawson (J W), 76d, 95d
- Dalhousie region: Clarke (J M), 13d
- Devonic history: Clarke (J M), 08b
- Eastern townships: Chalmers, 97; Dresser, 03; Ells, 87a, 88, 91; Logan, 50
- Entry Island (Magdalen Islands): Clarke (J M), 12a
- Fabre township, Timiskaming region: Harvie, 11a
- Gaspé region: Clarke (J M), 11a, 13d, 15b, c; Dawson (J W), 58b, 89a; Ells, 83a, 85; Hunt, 65a; Logan, 46; Low, 85; Mailhiot, 11; Murray, 47; Richardson (J), 58, 59; coast, sections: Logan, 46a
- Gaspé sandstone, age: Clarke (J M), 10c; Schuchert, 10a; Williams (H S), 10a
- General: Ami, 03b; Bailey (L W), 89a; Bayfield, 45; Chapman (E J), 64; Dawson (J W), 79f; Ells, 97d, 98a, d; Logan, 45b, 52b; Macfarlane, 71; Valiquette, 12; Walcott, 90f; Young, 13
- Gilbert River gold field: Dresser, 05
- Gold-bearing districts: Chalmers, 96
- Graptolite-bearing beds: Lapworth, 87
- Grenville district, Argenteuil Co.: Ells, 01a; Logan, 57, 59; Wilson (M E), 17, 17a
- Grenville-Hastings unconformity: Miller (W G), 08
- Helderberg, St. Helen's Island: Donald, 80
- Hudson Bay region: Low, 00, 02; east coast: Bell (R), 79
- Hudson Strait and Bay: Bell (R), 85b
- Hudson Strait region: Low, 98a, 99a
- Keekeek and Kewagama lakes region: Bancroft (J A), 12a
- Kewagama Lake area: Wilson (M E), 12a, 13c
- Labrador Peninsula: Low, 96a 98; Wilkins, 76a
- Lake St. John district: Dresser, 16, 16a, b; Laflamme, 83; McOuat, 72; Richardson (J), 72; Young (G A), 01
- Lake Timiskaming region: Barlow, 98; Wilson (M E), 10a
- Larder Lake district, Pontiac Co.; Wilson (M E), 12
- Laurentian: Adams (F D), 95; Logan, 65
- Montreal area: Adams (F D), 96
- north of Montreal: Adams (F D), 92b, 96a
- Ottawa district: Ells, 93a
- Laurentian highlands, banded gneisses: Wilson (M E), 13b
- Laurentian limestones: Logan, 59a
- Laurentian series: Logan, 60b
- Lemieux, Gaspé Co.: Mailhiot, 18
- Levis: Raymond (P E), 14d, e
- Little Metis Bay: Dawson (J W), 90c
- Lorraine: Foerste, 14a
- Magdalen Islands: Clarke (J M), 11b; Honeyman, 80a; Richardson (J), 81
- Magdalen River: Richardson (J), 58
- Mattawin River region: Adams (F D), 89b

## Quebec—Continued.

*Historical geology—Continued.*

- Mingan Islands: Richardson (J), 57
- Molybdenite area, Pontiac Co.: Thomson, 18
- Montarville mountain (St. Bruno): Hunt, 71k
- Montcalm and Joliette cos.: Adams (F D), 89a
- Monteregian Hills: Adams (F D), 13a; O'Neill, 14
- Montmorenci: Am G, 89b; Emmons (E), 41a; Green (W), 29
- Montreal area: Adams (F D), 98b, 99a; Ami, 97b, 00; Dresser, 97; Ells, 96; LeRoy, 01a; table of formations: Ami, 04a
- Montreal Island: Adams (F D), 04; Bigsby, 25
- Montreal-Quebec region: Logan, 54
- Morin anorthosite area: Adams (F D), 93, 13
- Mount Johnson: Adams (F D), 13a
- Mount Royal, Montreal: Buchan, 02, 14; geologic history: Buchan, 01
- Mount Wissick: Kindle, 14c
- Mount Yamaska: Young (G A), 06
- Murray Bay, lower St. Lawrence: Dawson (J W), 61b
- Nastapoka Islands, Hudson Bay: Low, 03
- National Transcontinental Railway in southern Que.: Dresser, 12
- Nipissing-Timiskaming area: Barlow, 99
- Northern Que.: Low, 95
- Northern Transcontinental Railway, Hervey Junction-Doucet: Bancroft (J A), 17
- Northwestern Que.: Barlow, 06a
- Nottaway River region: Bell (R), 96, 97, 02
- Opasatica district: Harvie, 11b
- Ordovician: Foerste, 16; Logan, 55a; Marcou, 61c
- Lake Timiskaming: Williams (M Y), 15
- Montreal: Raymond (P E), 13c
- north of the St. Lawrence: Laflamme, 87
- Ordovician-Siluric section of Mingan and Anticosti islands: Schuchert, 10d
- Orford area: Harvie, 12, 14
- Ottawa and Pontiac cos.: Ells, 94, 95; Keele, 17; Vennor, 78
- Ottawa Co.: Haycock, 05; Johnston (J F E), 05
- Ottawa region: Ami, 84b, 85, 87c, d, 96a; Anderson (W P), 82, 83; Ells, 95d, 96b, 00a, 01, 01b; Grant (J A), 64; Logan, 47; Selwyn, 82; Stansfield, 12; map: Ami, 02e
- Paleozoic breccia near Montreal: Harvie, 10
- Paleozoic-Archean contact: Laflamme, 87a
- Pembroke sheet: Ells, 07b
- Percé: Clarke (J M), 05a
- Phillipsburgh region: Billings, 61a
- Phosphatic nodules, Chazy formation, Ottawa: Ami, 88c
- Point Levis, Cambrian: Marcou, 64a
- Pontiac Co.: Ells, 94, 95, 96a; Keele 17; Vennor, 78
- Portneuf, Quebec, and Montmorency cos.: Low, 92a
- Portneuf Co., Montauban region: Bancroft (J A), 16
- Potsdam, Buckingham: Ami, 82
- Potsdam and Calciferous: Ells, 95a
- Potsdam group: Billings, 62c
- Pre-Cambrian: Miller (W G), 14
- Quebec area: Ami, 90, 91, 00, 03b; Bigsby, 28, 53; Ells, 90e; Hunt, 55a; Laflamme, 89; Marcou, 60a, 88c, 91; Raymond, 13b; Selwyn, 90a



## Quebec—Continued.

*Historical geology*—Continued.

Quebec group: Ami, 91b; Billings, 63a; Dawson (J W), 79f, 90g, 96; Ells, 90b, 95e; Logan, 60a, 61, 61b, 63a; Macfarlane, 79; Richardson (J), 66; Selwyn, 79a, b, 83b; Weston, 94

Quebec rocks, age: Logan, 62a

Radiolarite pebbles: Andrée, 14

Renfrew, Pontiac, and Ottawa cos.: Vennor, 78

Saguenay region: Dumais, 98; Laflamme, 85

St. Bruno Mountain: Dresser, 10a

St. Francis Valley, metamorphic rocks: Dresser, 06

St. Helen Island: Adams (F D), 13a; Nolan, 03;

Lower Helderberg: Deeks, 90

St. Lawrence, north shore region: Bayfield, 37, 40; Richardson (J), 70a

St. Lawrence River, region south of: Ellis, 92a; Logan, 49; Richardson (J), 70

St. Lawrence Valley: Giroux, 96

St. Maurice River region: Giroux, 94

Scaumenac Bay: Whiteaves, 80e

Serpentine belt: Dresser, 10b; Knox, 18

Shefford Mountain: Dresser, 99, 02

Sherbrooke district: Dresser, 05a

Southeastern Que.: Baddeley, 35; Selwyn, 83

Southern Que.: Dresser, 13; serpentine belt: Harvie, 14

Southwestern Que.: Ells, 92, 99

Structural relations, pre-Cambrian and Paleozoic rocks: Kindle, 15

Sutton Mountain: Winchell (N H), 02a

Taconie, Point Levis: Marcou, 61a

Taconie eruptives: Winchell (N H), 95i

Temiscouata and Rimouski cos.: Bailey (L W), 93

Temiscouata Lake: Gregory (H E), 00a

Timiskaming-Abitibi region: McOuat, 73

Thetford-Black Lake district (Coleraine sheet): Knox, 17, 18

Three Rivers sheet: Ells, 00

Timiskaming Co.: Wilson (M E), 18

Trenton group: Raymond (P E), 14c

Ungava Bay: Low, 99a

Utica: Ami, 92d

Yamaska Mountain: Young (G A), 04

*Mineralogy*.

Amphibole, Grenville: Harrington (B J), 03

Antimony minerals: Hitchcock, 64

Arsenie, Montreal: Evans (N N), 03

Barium sulphate, Templeton: Dana (E S), 90a

Black Lake area, Megantic Co.: Poitevin, 18

Calcite, fetid, Chatham: Harrington (B J), 05

Chloritoid: Hunt, 61b

Chrysoberyl, Maskinonge Co.: Evans (N N), 05

Chrysotile: Donald, 90a; Shipton: Smith (E G), 85

Coleraineite, origin: Poitevin, 18a

Dawsonite, Montreal: Harrington (B J), 74b, 81

Emeralds, Saguenay: Laflamme, 85b

Garnet: Harrington (B J), 80; white, Hull: Kunz, 84d; white, Wakefield: Kunz, 84c

General: Chapman (E J), 64

Haliburton and Baneroft areas: Adams (F D), 10d

Hornblende and titanite in essexite: Tertsch, 07

Loganite: Hunt, 51d

## Quebec—Continued.

*Mineralogy*—Continued.

Magnesite, Megantic Co.: Donald, 92

Magnetite illustrating isomorphism: Harrington (B J), 07

Montreal: Harrington (B J), 06

Ottawa Co.: Harrington (B J), 79

Ottawa district: Willimott, 85a

Ottawa Valley: Willimott, 05

Radium, Charlevoix Co.: Obalski, 04

Rutile and sapphirine: Warren (C H), 12

Samarskite, Berthier Co.: Donald, 84

Scapolite, Buckingham: Stansfield, 14a

Scolecite, Megantic Co.: Donald, 90

Serpentine: Donald, 90a

Spessartite, Ottawa Co.: Harrington (B J), 90a

*Paleontology*.

Anticosti: Billings, 57, 66; Schmitt, 04; Twenhofel, 14

Astroporites, Hull: Lambe, 96

Balanus, Pleistocene: Dawson (J W), 89e

Beatricea, Anticosti: Hyatt, 68b

Beluga, Leda clay, Montreal: Ardley, 16; Dawson (J W), 95e

Brachiopoda, Anticosti: Shaler, 65

Calciferous: Billings, 59e; Phillipsburgh region: Billings, 61a

Camarocystites: Foerste, 16a

Cambrian: Billings, 56a; Labrador: Matthew (G F), 97

Carbonic fauna of Magdalen Islands: Beede, 11

Cephalaspis, Gaspé: Lankester, 70

Chazy: Billings, 59e; Raymond (P E), 06

Aylmer: Sowter, 88

Gastropoda: Raymond (P E), 08

Conodonts: Hinde, 79

Cryptoceras, Lorette: Chapman (E J), 57a

Devonian: Clarke (J M), 07a

Fishes, Scaumenac Bay: Hussakof, 12

Plantae: Dawson (J W), 63b; Chaleur Bay: Dawson (J W), 81f

Dithyrocaris ? belli, Gaspé: Woodward (H), 71

Eastern townships: Ami, 88

Eozoon: Dawson (J W), 84a, 95d; Cote St.

Pierre: Dawson (J W), 76d; Stansfield, 13

Footmarks on Potsdam sandstone: Logan, 51, 52b; Owen (R), 51a

Footprints, Beauharnois: Lyell, 51

Gaspé: Clarke (J M), 05a

Plantae: Dawson (J W), 59a, 60g, 69e, 89a; Penhallow, 90; White (D), 13a

Silurian and Devonian: Billings, 74

Goniograptus, Levis formation, Levis: Ami, 89a, b

Graptolites: Hall, 58b; Lapworth, 87; Point Levy (Quebec): Hall, 58c; Quebec group: Dawson (J W), 83d; Hall, 65a

Grenville sheet: Ami, 01a

Gyriehniites, Gaspé: Whiteaves, 83a

Helderberg, St. Helen's Island: Donald, 80

Helderbergian fossils, Montreal area: Schuchert, 01

Levis: Raymond (P E), 14d, e

Lingula, Murray Bay: Billings, 61

Little Metis: Dawson (J W), 96

Lorraine fauna: Foerste, 14a

Marine shells, Montreal: Logan, 46b



## Quebec—Continued.

*Paleontology—Continued.*

Menocephalus salteri, Quebec group: Devine, 63a

Montreal area: Ami, 96; Bigsby, 25

Nematophyton, Gaspé: Penhallow, 89

Olenus ? logani, Quebec group: Devine, 63

Ordovician, Joliette: Ami, 92c

Bryozoa: Ami, 92b

Ostracoda, post-Tertiary: Brady, 71

Ostracoderm, Scaumenac Bay: Woodward (A S), 00

Ostrea, Pleistocene, Montreal: Ardley, 12

Ottawa area: Ami, 85, 87c, d, 96a, 01; Whiteaves, 83c

Palaeosaccus, Quebec group: Hinde, 93

Pembroke sheet, lists of fossils: Ami, 07

Piloceras: Dawson (J W), 81f

Pisces, Campbelltown and Scaumenac Bay: Traquair, 93; Whiteaves, 80c, 81a, b, 83b, 87c, 89c

Plectoceras: Whiteaves, 03e

Pleistocene, Anticosti: Grant (C E), 86

Pliocene, Montreal: Dawson (J W), 57a; St. Lawrence Valley: Dawson (J W), 57e, 58c

Point Levi, Quebec: Billings, 60e

Post-Pliocene, Montreal: Dawson (J W), 57a, 59c

Potsdam sandstone, Beauharnois: Billings, 56a

Pre-Carboniferous flora: Dawson (J W), 61c

Protiehnites, Potsdam sandstone: Owen (R), 52a

Prototaxites, Gaspé: Dawson (J W), 73c

Pterichthys, Chaleur Bay: Whiteaves, 80a

Quaternary Mollusca: Lyell, 41

Quebec area: Ami, 94; Bigsby, 53; Ford (S W), 87; Point Levis: Nicholson, 73

Quebec group, fauna: Logan, 60a, 61b

St. Bruno Mountain: Whiteaves, 10

St. Helen's breccias fauna: Williams (H S), 10

St. Hilaire: Ulrich, 10

Silurian, Anticosti: Billings, 65b

Mollusca: Billings, 74b

Nipissing-Timiskaming area: Ami, 99

Sponges, Little Métis, Quebec group: Dawson (J W), 88f, 90c, 93d; Hinde, 88

Stricklandinia: Billings, 68a

Tracks, Potsdam formation: Logan, 60

Trenton, Montreal: Whiteaves, 65

Trilobite, Percé: Clarke (J M), 13b

Trocholites: Whiteaves, 04a

Utica, Murray River: Ami, 88a

Wood, Devonian, Gaspé: Dawson (J W), 57c

Yamaska Mountain: Young (G A), 04

*Petrology.*

Alnoite, Ste. Anne de Bellevue: Adams (F D), 92a

Amphibolite: Adams (F D), 84

Amygdaloidal trap rock, eastern townships: Dresser, 01a

Anorthosite rocks, Saguenay River: Adams (F D), 85

Archean rocks, Chelsea: Dresser, 96

Bell River region: Wilson (M E), 14

Brome Mountain: Dresser, 02a, 04b, 06d

Buckingham area: Wilson (M E), 17b

Chibougamau region: Low, 06a

## Quebec—Continued.

*Petrology—Continued.*

Coleraine sheet: Knox, 18

Dike, hornblende lamprophyre, Richmond: Dresser, 01

Dikes, Lake Memphremagog: Marsters, 95a

Eastern townships: Dresser, 02c, 06c, 07

Elaeolite syenite, Montreal: Osann, 92

Feldspathic rocks: Hunt, 55

Haliburton and Bancroft areas: Adams (F D), 10d

Igneous rocks: Hunt, 60a

Ilmenite rocks, St. Urbain: Warren (C H), 12

Intrusive rocks: Hunt, 59

Kewagama Lake area: Wilson (M E), 13c

Labrador Peninsula: Ferrier, 96

Laurentian: Adams (F D), 95; north of Montreal: Adams (F D), 96a

Limestones in Laurentian rocks: Ingall, 94

Magnesian limestones: Hunt, 59

Monteregian Hills: Adams (F D), 03, 13a; Dresser, 09a; O'Neill, 14

Montreal Island: Bigsby, 25

Morin anorthosite area: Adams (F D), 93

Mount Orford: Dresser, 01b

Mount Yamaska: Young (G A), 06

Nepheline syenite, Montreal: Lacroix, 90

Nipissing-Timiskaming area: Barlow, 99

Paleozoic breccia near Montreal: Harvie, 10

Portneuf Co., Montauban region: Bancroft (J A), 16

Ophiolites, Green Mountains: Hunt, 57e

Ottawa Co.: Harrington (B J), 79

Ottawa Valley: Osann, 02

Pyroxenites, Grenville series, Ottawa Co.: Gordon (C H), 04

Quebec: Hunt, 55a

Quebec and Montmorency cos.: Ferrier, 92

Quebec group, structure of rocks: Adams (F D), 83

Radium in rocks of Montreal: Eve, 07

Rigaud Mountain: LeRoy, 01

St. Bruno Mountain: Dresser, 10a

St. Francis Valley, metamorphic rocks: Dresser, 06

St. Helen's Island: Nolan, 03

Scapolite-bearing rocks, Ottawa Co.: Adams (F D), 88a

Serpentine, southeastern Que.: Dresser, 05b

Serpentines, Green Mountains: Hunt, 57m

Shefford Mountain: Dresser, 99, 01e, 02, 02a

Syenite gneiss, Ottawa area: Gordon (C H), 95b

Temiscouata Lake: Gregory (H E), 00a

*Physical geology.*

Changes of level, postglacial: Goldthwait, 12

Earthquakes: Laflamme, 07

Ice packing, St. Lawrence: Logan, 42, 46b

Landslide, Blanche River: Chalmers, 99

Lievre River: Barlow, 05a; Ells, 04e

Montreal region: Logan, 46b

Notre-Dame de la Salette: Ells, 08b

Portneuf Co.: Dawson (G M), 00b

St. Alban: Laflamme, 95, 00

Ste. Anne, 1894: Laflamme, 98

St. Lawrence Valley: Chalmers, 00

St. Lue de Vincennes: Laflamme, 00a



## Quebec—Continued.

*Physical geology*—Continued.

- Peat beds, Anticosti Island: Twenhofel, 10  
 Sand-filled vein: Clarke (J M), 07b  
 Vein systems in Percé rock: Clarke (J M), 18c

*Physiographic geology.*

- Anticosti: Schmitt, 04  
 Beaches, lower St. Lawrence: Goldthwait, 11,  
 11a; Taylor (F B), 11  
 Bic: Goldthwait, 13a  
 Boulder drift, Little Metis: Dawson (J W), 86c  
 Chaleur Bay: Goldthwait, 13a  
 Channel, buried, in valley of Maskinonge  
 River: Wright (G F), 98a  
 Covey Hill region: Spencer (J W), 12b  
 Fjords of the Saguenay: Upham, 08  
 General: Bailey (L W), 89a; Buchan, 05; Gold-  
 thwait, 13a; Kindle, 15; Young, 13  
 Glacial drift, Magdalen Islands: Goldthwait,  
 14e, 15  
 Glacial geology: Low, 93a, b  
 Glaciation: Ramsay, 59; Willcox, 85  
 eastern Canada: Chalmers, 89a  
 Mount Orford: Chalmers, 05a; Dresser, 00  
 Orford and Sutton Mountains: Wilson (A W  
 G), 06a  
 Ottawa Valley: Johnston (W A), 16b  
 Rimouski: Honeyman, 85  
 southeastern Que.: Chalmers, 87a  
 Haliburton and Bancroft areas: Adams (F D),  
 10d  
 Kewagama Lake area: Wilson (M E), 13c  
 Labrador, coast, deepest fiord: Daly (R A), 00a  
 Lake Temiscouata: Bailey (L W), 86b  
 Marine beaches: Goldthwait, 14c  
 Monteregian Hills: Dresser, 06a  
 Montreal, upper marine limit: Goldthwait, 13c  
 Montreal region, Pleistocene: Stansfield, 14  
 Ottawa basin, sands and clays: Ells, 98c  
 Ottawa River, ancient channels: Ells, 01e  
 Ottawa Valley, upper: Odium, 84  
 Pleistocene: Buchan, 05  
 Anticosti: Grant (C E), 86  
 Montreal: Stansfield, 15  
 Ottawa area: Johnston (W A), 17  
 Pleistocene shore lines, St. Lawrence Valley:  
 Chalmers, 00  
 Pliocene, Montreal: Dawson (J W), 57a; St.  
 Lawrence Valley: Dawson (J W), 57e  
 Post-Pliocene, Montreal: Dawson (J W), 57a  
 Rivière du Loup and Tadoussac: Dawson (J  
 W), 65  
 St. Lawrence Valley: Dawson (J W), 59c  
 Quebec and vicinity: Goldthwait, 13a  
 Raised shore lines, St. Lawrence Valley and  
 Great Lakes: Chalmers, 04a  
 Rivière du Loup: Goldthwait, 13a  
 Saguenay: Dumais, 98  
 Shore lines, marine, southeastern Que.: Chal-  
 mers, 96a; Goldthwait, 14b  
 Surface geology, eastern Que.: Chalmers, 05  
 Gaspé Peninsula: Bell (R), 63  
 St. Lawrence Valley: Chalmers, 98a, 08  
 southeastern Que.: Chalmers, 87, 98  
 southern Que.: Chalmers, 04b  
 Timiskaming Co.: Wilson (M E), 18

## Quebec—Continued.

*Underground water.*

- Artesian wells, Montreal: Cumming, 16  
 Montreal Island: Adams (F D), 04, 05  
 Quebec formation, Idaho: Bradley, 72a  
 Quebec group: Ami, 91b; Billings, 63a; Dawson (J  
 W), 79f, 83f, 90g; Ells, 90b, 95e; Hunt, 67d,  
 77a, 90a; Logan, 60a, 61, 62a, 63, 63a;  
 Macfarlane, 79; Richardson (J), 66, 70;  
 Selwyn, 79a, b, 83b, 87; Walcott, 90f;  
 Weston, 94; fauna: Logan, 60a; New  
 Brunswick: Hind, 65; structure of rocks:  
 Adams (F D), 83  
 Queen Charlotte Islands: Dawson (G M), 80, 89b  
 Questionnaire on Archean: Frazer, 87  
 Quicksilver.  
 Alaska, Kuskokwim region: Smith (P S), 15b  
 Anticlinal theory: Udden, 18a  
 Arizona, Phoenix Mountains: Schrader, 18  
 California: Bradley (W W), 18a; Rolland,  
 78a, b; San Luis Obispo Co.: Logan, 17  
 Canada: Ingall, 97  
 General: Baverstock, 02; Becker, 75b, 93;  
 Horton, 06; Joseph, 16; McCaskey, 08c;  
 Phillips, 08  
 Natural solutions of cinnabar, gold, and asso-  
 ciated sulphides: Becker, 87b  
 Ontario, Cobalt: Clevenger, 15  
 Secondary enrichment: Broderick, 16  
 Texas, Terlingua district: Udden, 17b, 18a  
 United States: McCaskey, 08c; U S G S, 83  
 Rabbit Ears region, Colo.: Grout, 13a  
 Racewinite, Bingham: Winchell (A N), 18b  
 Radioactivity.  
 Bearings on geology: Chamberlin (T C), 11a, 12  
 Canada, mineral springs: Satterly, 17  
 Colorado, Manitou Springs: Shedd, 13  
 General: Becker, 15  
 Meteorites: Quirke, 17b  
 Relations to geology: Becker (G F), 08a; Day  
 (A L), 08; Joly, 09  
 Thermal waters of Yellowstone National Park:  
 Schlundt, 09  
 Radium-bearing minerals: Malcolm, 14  
 Radium.  
 Colorado: Alsdorf, 16; Bastin, 14a; Phillips  
 (A H), 04  
 Gilpin Co.: Rickard (F), 13  
 southwestern: Kithil, 17  
 Distribution of ore deposits: Moore (R B), 18  
 General: Howard, 14; Moore (R B), 13; Par-  
 sons (C L), 17  
 Montreal: Eve, 07  
 Pennsylvania, Mauch Chunk, carnotite:  
 Wherry, 14  
 Quebec, Charlevoix Co.: Obalski, 04  
 Radium-bearing minerals: Malcolm, 14  
 Uranite, Colorado: Pearce, 16  
 Utah, southeastern: Kithil, 17  
 Radiolaria.  
 California, Angel Island: Hinde, 94  
 Manitoba, Cretaceous: Tyrrell, 91b; Pierre for-  
 mation: Rüst, 92  
 Mexico, Oaxaca: Felix, 93  
 Radiolarian cherts, Oregon: Smith (W D), 16; of  
 Franciscan group: Davis (E F), 18a  
 Radiolarite pebbles: Andrée, 14



Ragland oil field, Ky.: Munn, 13

Rain marks, fossil:

Connecticut Valley: Lyell, 42d; Redfield, 51a

Formation: Rogers (H D), 55a; Wyman, 55b

General: Deane, 45c; Jackson, 52; Kindle, 16c; Lyell, 51b; Redfield, 43a; Warren (J C), 55b

Rainy Hollow district, B. C.: McConnell, 14d

Rainy Lakeregion, Ont.: Lawson, 87a, 12a; Archean geology: Lawson, 13d

Rainy River district, Ont.: Fleming, 09; surface geology: Johnston (W A), 15

Raleigh folio, W. Va. (no. 77): Campbell (M R), 02

Ramosite: Luquer, 04

Rampart gold placer region, Alaska: Prindle, 06b

Rampart quadrangle, Alaska: Eakin, 13; Prindle, 08, 10

Rampart region, Alaska: Eakin, 12; Hess, 08a

Ramparts, lake: Gilbert, 08

Rancho La Brea deposits, Cal.: Stoner, 13; Merriam (J C), 11, 12, 12a, 13e

Random terrane, Newfoundland: Walcott, 00

Randsburg quadrangle, Cal.: Hess, 10a

Rangely oil district, Colo.: Gale, 08b

Rare earths.

California, Plumas Co.: Edman, 98

Colorado: Fleck, 08; Boulder Co.: Wood (J R), 10

Florida: Liddell, 17

General: Baskerville, 08; Dickinson, 08; Hess, 12a; McLeod, 14; Pratt, 16; Schaaf-Regelmann, 07; Schaller, 18; Walsh, 07

Pegmatite veins: Obalski, 06a

Quebec: Nagant, 06; Obalski, 06a

Wyoming, Rambler mine: Knight (W C), 02a

Raritan flora: Berry, 11, 15a

Raritan folio, N. J. (no. 191): Bayley, 14

Raritan formation, age: Berry, 10j

Raritan quadrangle, N. J.: Bayley, 14

Raton Mesa region, Colo.-N. Mex.: Lee (W T), 17

Ravenswood grandiorite: Ziegler, 11

Rawhide, Nev.: Del Mar, 08

Ray copper district, Ariz.: Tolman, 09c; Truesdell, 09

Receptaculites: Billings, 65a; Hall, 63d

Reconnaissance surveys: Featherstonhaugh, 35, 36

Rectoglossa: Van Tuyl, 14

Recurrence of faunas: Williams (H S), 82b

Red beds.

Colorado: Cross, 05c

General: Case, 13; Henning, 13

Laramie Plains: Knight (W C), 02c

Llano Co., Tex.: Hess, 08e

Llano and Burnet quadrangles: Paige, 12

Oklahoma, age: Adams (G I), 01b

Oklahoma and Texas: Becde, 07

Origin: Baker (C L), 16; Becde, 12a; Knight (S H), 17; Tomlinson, 16

Origin of color: Dawson (J W), 49; Richardson (G B), 03

Texas, Oklahoma, and Kansas: Adams (G I), 03a

Western States: White (C A), 79f

Wyoming, western, origin: Bronson, 15

Red Beds fauna: Becde, 07

Red clay, composition: Clarke (F W), 07

Red Cliff region, Colo.: Means, 15

Red color, origin: Russell, 89a

Red-colored rocks, paucity of organic remains in: Newberry, 70c

Red Mountain, Ariz.: Atwood, 06

Red River valley clays, Ky.: Gardner (J H), 05a

Redding folio, Cal. (no. 138): Diller, 06

Redfield, W. C., biography: Rogers (W B), 57c

Red Lodge coal field, Mont.: Woodruff, 09

Redonda, phosphate: Hitchcock (C H), 91; Morse, 94; Shepard, 69c

Redstone quartzite, Minn.: Sardeson, 08a

Reef structures in Clinton and Niagara, New York: Sarle, 01

Regional slopes: Reinecke, 16b

Relief maps.

Alberta, Bighorn coal basin: Malloch, 11

Alaska: Brooks (A H), 06d, 14b

Arkansas, Hot Springs area: Purdue, 10a

California: Cal S M B, 10; northern: Bryan, 15

Chattanooga district: Hayes, 94f

Colorado, Cripple Creek district, topographic model: Byler, 13; south central: Cross, 14

Idaho: Livingston, 18

Lake Superior district: Harder, 18; Van Hise, 11

Maine, Mount Katahdin: Hamlin (C E), 81

Malaspina glacier region: Martin (L), 09a

Mexico: Bustamante, 18

Nebraska: Darton, 99a, 03b

New York, southeastern: Berkey, 11

New York City: Berkey, 11

Oregon: Oreg B M, 15a; Swartley, 14

Porto Rico: Berkey, 15a

Saskatchewan, Souris River coal field: Dowling, 04a

Shawangunk Mountain, Ulster Co., N. Y.: Darton, 94h

Utah, high plateaus: Dutton, 80

Washington: Landes, 02a; Shedd, 10

Wisconsin: Hotchkiss, 10; Huels, 15; Whitbeck, 11

Remsen quadrangle, N. Y.: Miller (W J), 09

Reno region, Nev.: Anderson (R), 09a

Rensselaeria: Williams (H S), 07

Rensselaeria fauna: Williams (H S), 05

Replacement: Stevens, 13b; of sulphides by quartz: Wolcott, 17

Republic district, Wash.: Umpleby, 10

Republican River Valley, Nebr.: Condra, 07

Reptilia.

Adocidae: Cope, 70g, 71c, f

Agathaumas, Wyoming: Cope, 73f

Alabama, Cretaceous: Gilmore, 12

Discosaurus: Leidy, 51d

Pickens Co.: Leidy, 70b

Alberta, Cretaceous: Lambe, 99c, 14d

Dinosauria, Belly River formation: Lambe, 14e

Red Deer Canyon: Brown (B), 11

Alligator, Hell Creek beds, Montana: Gilmore, 11; Tertiary: Matthew (W D), 18e

Alligator snapper, Texas: Hay (O P), 11

Allosaurus: Matthew (W D), 08

Allosaurus fragilis: Gilmore, 15a

Amphichelydia: Hay (O P), 05, 05g

Amphicoelias: Cope, 78n, za; Dakota group, Colorado: Cope, 77n



## Reptilia--Continued.

- Amphimys, Tertiary, Georgia: Cope, 78e  
 Amphisbacnidae: Baur, 93  
 Amphorosteus: Gibbes, 51  
 Anatomy, cervical region: Osborn, 00c; cranial arches: Cope, 92a  
 Ancestry: Baur, 87  
 Anchiceratops, Alberta: Brown (B), 14a  
 Anchisaurus: Marsh, 92e; restoration: Marsh, 93b  
 Angistorhinus, Triassic phytosaur, Wyoming: Mehl, 13, 15  
 Ankylosauridae: Brown (B), 08c  
 Anosteira: Hay (O P), 06a  
 Apatosaurus: Holland, 16, 16a; Mook, 17; Riggs, 03  
 Aquatic life, modifications of limb skeleton for: Osburn, 06  
 Araeoscelis, Texas, Permian: Williston, 14c  
 Araeoscelis and Casca skulls: Williston, 13b  
 Archegosaurus: Baur, 97b  
 Archelon: Wieland, 96, 00, 02, 03  
 Archosauria: Huene, 14  
 Arctosaurus, Arctic regions: Adams (A L), 75  
 Aspideretes, Belly River formation: Lambe, 14a  
 Astrodon: Lucas (F A), 04e; Atlantosaurus beds, Wyoming: Hatcher, 03a  
 Atlantochelys: Agassiz (L), 49; Hay (O P), 98  
 Aublysodon, New Jersey: Leidy, 68f  
 Baena: Lambe, 06b  
 Baena hatcheri, Laramie, Wyoming: Hay (O P), 01  
 Baptonodon: Gilmore, 05, 06, 07a; Knight (W C), 03a; Marsh, 80b; teeth: Gilmore, 02; teeth and dental grooves: Gilmore, 03  
 Baptonodon not a toothless ichthyosaur: Holland, 08b  
 Baptonodon beds: Marsh, 95  
 Barosaurus: Lull, 17e  
 Basilemys sinuosus, Montana Laramie beds: Riggs, 06  
 Batrachiosaurus: Harlan, 39, 41  
 Batrachotherium: Harlan, 39a  
 Bathygnathus, Prince Edward Island: Leidy, 54, 81  
 Belodon, New Mexico: Cope, 81v  
 Belodont reptiles: McGregor, 02  
 Black Hills region: O'Harra, 10  
 Bolosaurus: Broom, 13a  
 Bolosaurus striatus: Case, 07b  
 Boremys, Cretaceous, Alberta: Lambe, 06c  
 Brachauchenius: Lucas (F A), 04b; Williston, 07  
 Brachiosauridae: Riggs, 04  
 Brachiosaurus: Matthew (W D), 15h; Riggs, 03a  
 Brachyceratops, Two Medicine formation, Montana: Gilmore, 17  
 Brachysaurus, Fort Pierre beds: Williston, 97e  
 Bridger Basin: Hay (O P), 05e  
 Brimosaurus, Arkansas: Leidy, 54a  
 Brontosaurus: Gratacap, 02a; Hatcher, 01e; Matthew (W D), 05b; Osborn, 05l, 06a  
 vertebral column: Riggs, 03b  
 weight: Gregory (W K), 05  
 Wyoming: Hatcher, 02b

## Reptilia--Continued.

- Caimanoidea visheri, South Dakota: Mehl, 16  
 Camaeosaurus supremus: Cope, 77v  
 Camarasaurus: Cope, 77m; Mook, 14, 14a; Osborn, 98f, 17b; and Morosaurus, identity: Osborn, 16d  
 Campsosaurs, North Carolina: Leidy, 56i  
 Camptonotus: Marsh, 79i  
 Camptosaurus: Gilmore, 07, 09, 12a; restoration: Marsh, 94  
 Carboniferous, Ohio: Cope, 72o  
 Centrosaurus, Alberta: Lambe, 04b, 05a  
 Centrosaurus apertus, parietal crest: Lambe, 10b  
 Ceratopsia: Brown (B), 14a; Hatcher, 05, 07; Lull, 07; evolution: Lull, 12  
 Ceratopsian dinosaurs, cranial musculature: Lull, 08a  
 Ceratopsidae: Marsh, 91a  
 Ceratosaurus: Marsh, 84d; restoration: Marsh, 92g  
 Champsosaurus, New Mexico: Cope, 81r; osteology: Brown (B), 05  
 Chelonia: Hay (O P), 12a  
 Chelydosauria: Case, 05c  
 Cheneosaurus, Cretaceous, Alberta: Lambe, 17a  
 Chisternon: Hay, 06a; Leidy, 72h  
 Cimoliosaurus, New Jersey: Leidy, 51d; Niobrara formation, Kansas: Williston, 90a  
 Claosaurus: Marsh, 92f, 93a; restoration: Beecher, 01c, 02c; Marsh, 92g  
 Classification: Osborn, 03, 03f, 04g, n, p, 05m  
 Clepsydrops, columella: Cope, 84za  
 Clepsysaurus, North Carolina: Emmons (E), 59a; Pennsylvania, Newark group: Lea, 53  
 Clidastes: Cope, 69f, 81p  
 Coelophysus, Triassic, New Mexico: Cope, 89g  
 Coeluria, Jurassic: Marsh, 81a  
 Coelurus: Cope, 87b  
 Colonosaurus: Marsh, 72q  
 Colorado: Leidy, 70b  
 Cretaceous: Cope, 78ze  
 Dakota beds: Cope, 78h, k  
 Morrison: Anon, 77a  
 Compsemys, Cretaceous, Alberta: Lambe, 01a  
 Conchochelys, Puerco beds, New Mexico: Hay (O P), 05b  
 Connecticut, Triassic: Lull, 12b  
 Connecticut Valley: Marsh, 91d  
 Conosaurus: Gibbes, 51; Leidy, 68g  
 Corythosaurus: Brown (B), 14c; Matthew (W D), 15e; skeleton, musculature, and epidermis: Brown (B), 16a  
 Cotylosauria: Case 11; Cope, 95e, k, 96a, e, h; Williston 08; and Nectosaurus: Moodie, 09  
 Cranial arches, homologies: Cope, 92a  
 Creosaurus: Williston 01a  
 Cretaceous: Cope, 68j, 70e, 75; Leidy, 65, 65a 73; Marsh, 71c  
 Benton, ichthyosaurian: Gilmore, 14b  
 dinosaurs: Lull, 12a  
 Crocodile, Cretaceous, New Jersey: Morton, 44a  
 Judith River beds, Montana: Holland, 09  
 Virginia, Westmoreland Co.: Leidy, 51b, 52c  
 Wyoming: Leidy, 70n, r; Ceratops beds: Gilmore, 10



## Reptilia—Continued.

- Crocodyles, amphicoelian: Williston, 06  
 Crocodilia, anatomy: Baur, 86b  
 Crocodilian genus, Judith River formation, Alberta: Lambe, 07  
 Cryptoelidus: Matthew (W D), 10f  
 Cuba, Cienfuegos: Leidy, 68c  
 Cumnoria (Camptosaurus), pelvis: Williston, 90b  
 Cynocercus incisus, Kansas: Cope, 72c  
 Dacentrurus: Lucas (F A), 02c  
 Dakota beds, Colorado: Cope, 78p  
 Dermal scutes of mosasauroid reptiles: Marsh, 72b  
 Dermochelys: Hay (O P), 98  
 Descriptions: Leidy, 51d  
 Desmatochelys, Kansas: Williston, 94b  
 Development and geologic relations: Case, 98  
 Diadectes: Broom, 14; Cope, 78zb; restoration: Case, 07  
 Diadectes lentus and Animasaurus carinatus: Case, 12a  
 Diadectidae: Cope, 86b; osteology: Case, 05  
 Diapsida: Osborn, 03  
 Diaptosauria: Osborn, 03  
 Diceratops, restoration: Lull, 05b  
 Diclonius: Cope, 83x, zh, 84ze, 85w  
 Dimetrodon: Baur, 99; Case, 97b, 05a: Cope, 86o  
   brain cavity: Case, 97  
   fore foot: Case, 04a  
   skull: Case, 04  
 Dimetrodon incisivus: Cases, 10c, 15b  
 Dinophis, Tertiary, New Jersey: Marsh, 69c  
 Dinosaur, crested, Alberta: Brown (B), 12b, 13  
   Dakota beds, Colo.: Cope, 77b  
   footprints, Arizona: Riggs, 04a; Jurassic: Marsh, 99; Glen Rose limestone: Shuler, 17a  
   Fort Lee, N. Y.: Matthew (W D), 11  
   Kansas chalk: Sternberg, 09b  
   Montana: Cope, 88s  
   New Jersey, Cretaceous: Cope, 66b; Woolman, 97  
   mummy: Osborn, 11  
   pathological lesion: Moodie, 16a  
   societies: Lull, 09; Williston, 09c  
 Dinosauria: Baur, 84, 91; Beard, 01; Cope, 77r; Gilmore, 15d, e; Huene, 06, 08, 14c, d; Lakes, 79; Lucas (F A), 02a; Marsh, 78a, 89a, b, 90; Matthew (W D), 15c; Osborn, 05; Owen (R), 78; Riggs, 01b  
   Alberta: Brown (B), 13; Lambe, 14c, d, 15; Matthew (W D), 12b  
   armored: Wieland, 11  
   Bone Cabin quarry: Osborn, 04j  
   carnivorous: Hay (O P), 08a  
   sauropodous, habits and pose: Hay (O P), 08c  
   classification: Cope, 82o; Marsh, 81h, 95a; and affinities: Marsh, 84e; and phylogeny: Huene, 09  
   Cretaceous: Lull, 12a; Marsh, 90b; iguanadont: Osborn, 09d  
   Denver beds: Cannon, 89a  
   distribution: Lull, 10a  
   Fort Pierre shales: Douglass, 02b  
   horned, Cretaceous: Marsh, 88b, 89d, e

## Reptilia—Continued.

- Dinosauria: iguanodont, Upper Cretaceous: Osborn, 09d; epidermis: Osborn, 09a  
 Jurassic: Cope, 79n; Holland, 12; Marsh, 77f, 78e, 80c, 83a, 84, 84b, 87b; Williston, 78  
   Greenland: Fraas, 04  
   Wyoming: Osborn, 00  
 Laramie: Cope, 89j, l, 92k  
 locomotion: Hay (O P), 10b  
   mode of life: Versluys, 10  
 Maryland, Lower Cretaceous: Lull, 11  
 Montana: Gilmore, 14a  
 Niobrara Co., Wyo.: Lull, 15c  
 North America: Marsh, 96  
 osteology: Gilmore, 14  
 pelvis: Baur, 84a  
 phylogeny: Huene, 09; Osborn, 00f  
 Pose of sauropodous dinosaurs: Hay (O P), 11a; Matthew (W D), 10d  
 Potomac formation: Marsh, 88  
 relation to birds: Baur, 85; Cope, 69e  
 restorations: Holland, 10; Lucas (F A), 01e; Marsh, 93e  
 "sacral brain": Lull, 17b  
 sauropod dinosaur, Trinity, Oklahoma: Larkin, 10; habitat: Mook, 18  
 sphenoidal sinus: Moodie, 15f  
 sternum: Cope, 86i; Marsh, 80d  
 structural features: Holland, 15  
 structure and habits: Abel, 09  
 tarsus: Baur, 83  
 Tertiary, Colorado: Lee (W T), 13b  
 "third trochanter": Cope, 83z  
 Triassic: Huene, 06; Marsh, 92e  
 Upper Cretaceous: Brown (B), 08c  
 Wyoming: Gilmore, 13  
 Dinosaurian distribution: Lull, 10a  
 Dinosaur-turtle analogy: Wieland, 12, 12a  
 Diplodocus: Abel, 09; Cope, 84s; Hatcher, 01, 03; Hay (O P), 08b, c; Holland, 06, 08c, 10, 16a; Marsh, 84; Osborn, 99a, e, g; Stremme, 09; Tornier, 09, 09a, b, 10j; Versluys, 10  
   clavicle: Nopcsa, 05  
   fore and hind limbs: Mook, 17a  
   mode of locomotion: Hay (O P), 10b  
   osteology: Holland, 06  
   restoration: Abel, 10; Hutchinson, 17  
   skull: Hay (O P), 08b; Holland, 08c  
   vertebral formula: Hatcher, 00a; Holland, 00  
 Diplodocus carnegiei: Holland, 10  
 Discosaurus: Leidy, 70v  
 Dissorophus: Cope, 96g  
 Distribution, etc., Carboniferous: Williston, 14d  
 Dolichorhynchus, restoration: Williston, 02  
 Dryptosaurus, Edmonton series: Lambe, 04  
 Dryptosaurus incrassatus, Alberta: Lambe, 03a  
 Dystrophaeus, Triassic, Utah: Cope, 77i  
 Ear structure in primitive reptiles: Case, 14b  
 Echmatemys: Hay (O P), 06  
 Edaphosaurus: Case, 14a; Archer Co., Tex.: Case, 18  
 Edaphosaurus pogonias, skull: Case, 06a  
 Edmontosaurus regalis, Edmonton formation: Lambe, 17b  
 Elasmosaurus: Cope, 68b, 70c, 77q; Leidy, 76, 70d



## Reptilia—Continued.

- Elasmosaurus serpentinus*: Cope, 77g  
*Elosaurus*, Wyoming: Peterson, 02  
*Embolophorus*: Case, 03  
*Empedocles*, skull: Cope, 80h  
*Emys*, Nebraska: Leidy, 52e  
 Eocene: Cope, 82ze  
*Eoceratops*: Lambe 15  
*Epanterias*, Dakota beds, Colorado: Cope, 78x  
*Euclastes*: Cope, 67a  
 Florida: Hay (O P), 16b  
 Footprints: Lull, 04b; Connecticut Valley: Field, 60  
 Fox Hills: Cope, 87g  
 Gastroliths: Brown (B), 07a; Cannon, 06a; Wieland, 06c, 07  
*Gavial*, Eocene, New Jersey: Marsh, 70a; Dekay, 36  
 General: Ballou, 97, 98; Baur, 86; Beard, 01a; Cope, 71b, g, k, 75d, 95j; Harlan, 34, 34e; Leidy, 70d; Lull, 14b; Marsh, 71g; Moodie, 09; Shimer, 15a; Williston, 02a, b, 14  
*Geosaurus*, New Jersey, Dekay, 30  
*Glyptodont*, Jalisco, Mex.: Brown (B), 12  
*Goniopholis*, Colorado: Cope, 88r  
*Goniopholis* ? *gilmorei*, Jurassic, Wyoming: Holland, 05  
*Gorgosaurus*, Cretaceous, Alberta: Lambe, 17  
*Graphiodon*, Massachusetts: Leidy, 70r  
*Hadrosauridae*: Cope, 83k  
*Hadrosaurus*: Cope, 69f; Leidy, 70h; Marsh, 72c  
 New Jersey; Foulke, 58  
 pelvis: Hawkins, 74, 75  
*Hadrosaurus foulkii*, Cretaceous, N. J.: Leidy, 58g  
*Halisaurus*, Greensand, New Jersey: Marsh, 69b  
*Hallopoda*: Baur, 90b; Marsh, 90a  
*Hallopus victor*: Huene, 08a  
*Haplocanthus*, Canyon City, Colo.: Hatcher, 03f  
*Haplocanthosaurus*: Hatcher, 03  
*Helcodus*: Gibbes, 51  
*Holops*, New Jersey: Cope, 72i  
*Holosaurus abruptus*: Capps, 07  
*Hypacrosaurus*, Edmonton Cretaceous: Brown (B) 13c  
*Hyporhina*, South Dakota: Baur, 93  
*Hypsirophus*, Colorado: Cope, 78r  
*Ichthyopterygia*: Baur, 87c; Cope, 70k; origin: Baur, 87a; Triassic, California and Nevada: Merriam (J C), 02  
*Ichthyosaur*, Triassic, Nevada: Merriam (J C), 05  
*Ichthyosauria*: Baur, 95a  
 ancestry: McGregor, 02a  
 evolution: Osborn, 05b  
 Triassic, California: Merriam (J C), 03, 03d  
 limb structure: Merriam (J C), 05c  
 primitive characters: Merriam (J C), 03c  
*Ichthyosaurian*, middle Triassic: Merriam (J C), 10  
*Ichthyosaurus*: Harlan, 34b  
 Arctic regions: Belcher, 56; Exmouth Island; Owen (R), 55  
 Missouri: Harlan, 34d  
 new: Matthew (W D), 08a  
 Illinois: Cope, 75x, 78d; Vermilion Co.: Case 00  
 Indiana, Pleistocene: Hay (O P), 12

## Reptilia—Continued.

- Isodectes punctulatus*: Williston, 08a  
 Judith River formation turtles: Knowlton, 11b  
 Jurassic: Marsh, 79i; plesiosaurs, Wyoming: Mehl, 12a  
 Kansas: Cope, 69c, 70l, 71, 72h, n, 78f; Sternberg, 08; Williston, 98  
 Fort Wallace: Cope, 68n  
 Sheridan: Cope, 72m  
 Testudinata, Cretaceous: Cope, 72c  
*Kritosaurus*, Ojo Alamo beds, New Mexico: Brown (B), 10  
*Labidosaurus*, Permian, Texas: Williston, 17  
*Labidosaurus hamatus*, Permian, Texas: Broili, 08  
 Lacrimal and alisphenoid: Gregory (W K), 13a  
 Laelaps: Cope, 66d, 68m, 77p, 92c  
 Laramie formation: Marsh, 92d, f  
*Laurospondylus*, Edmonton Cretaceous: Brown (E P), 13  
 Leatherback turtle, Miocene, Maryland: Palmer (W), 09  
*Leidyosuchus sternbergi*, crocodile from Wyoming Ceratops beds: Gilmore, 10  
*Leiodon*: Owen (R), 78  
*Leptoceratops*, Alberta: Brown (B), 14d  
*Lestosaurus*: Marsh, 72f  
*Limnoscelis*, New Mexico: Williston, 12a  
*Liodon*: Cope, 70k  
 Lizard, Permian, Texas: Williston, 13d  
 Lizards, Oligocene: Douglass, 08c  
*Lysorophus*: Case, 02a  
 limbs: Finney, 12  
 Permian, Texas: Huene, 13b  
*Macelognatha*: Marsh, 84a  
 Mandible, primitive structure: Williston, 13a  
 Marine reptile, Triassic, Nevada: Merriam (J C), 06c  
 Marine reptiles: Merriam (J C), 12  
 Maryland: Cope, 68l  
 Arundel formation: Lull, 11a  
 Frederick Co., Newark rocks, footprints: Mitchell, 95  
 Lower Cretaceous: Lull, 11, 11a  
 Massachusetts, *Stegomus*, probable footprints: Lull, 04a  
*Megadactylus* (Hitchcock): Cope, 70a  
*Megalneusaurus*, Jurassic, Wyoming: Knight (W C), 98  
*Megalosaurus*: Leidy, 68f  
 Mexico, Jalisco, glyptodont: Brown (B), 12  
 Microsauria, ancestors of Reptilia: Moodie, 09c; systematic position: Baur, 97a  
 Mississippi, Columbus: Leidy, 66  
 Missouri River region: Cope, 77f  
*Monoclonius*, Alberta: Brown (B), 14b, 17, 17a; Lambe, 04b, 05a  
 Montana, ceratopsian dinosaur: Gilmore, 14a  
 Fort Union beds: Cope, 76g  
 Judith River: Leidy, 56d  
 Judith River and Fox Hills: Cope, 77e  
*Morosaurus*: Osborn, 05l, 06a; Riggs, 01a; sacrum: Williston, 98a  
*Morosaurus agilis*: Gilmore, 07  
 Morrison fauna: Mook, 16  
 Mosasaurid, dermal covering, Kansas: Snow, 78; Flagler, Colo.: Lee (W T), 97



## Reptilia—Continued.

- Mosasauroidea: Baur, 92, 95, 96; Osborn, 99, 00c;  
Williston, 91a, 92a, 04  
diseases: Moodie, 18b  
distribution: Williston, 97h  
Kansas, restorations: Williston, 97g  
osteology: Holland, 08  
position: Baur, 90  
Mosasauroid reptiles: Marsh, 72f, 80a  
Mosasaurus: Dekay 30; Gibbes, 50a, 51;  
Leidy, 57d, 59a; Whitfield, 00c  
Greensand, New Jersey: Marsh, 69b  
Mount Holly, N. J.: Morton, 44b  
synonymy: Leidy, 59a  
Mosasaurus occidentalis, New Jersey: Morton,  
45  
Muraenosaurus and Tricleidus: Mehl, 12a  
Mycterosaurus longiceps, Mitchell Creek, Tex.:  
Williston, 15a  
Nanosaurus agilis: Huene, 08b  
Naosaurus, Permian, Texas: Cope, 86o; Osborn,  
07b  
Nebraska: Leidy, 52a, 53  
Chelonia: Leidy, 51, 52b  
Cherry Co., Testudo: Barbour, 15g  
Niobrara valley: Leidy, 58e  
Nectosaurus osteology: Merriam (J C), 08a  
Nevada: Leidy, 68b  
New Jersey: Cope, 67, 68, 68g, 1, 69c; Marsh, 70c  
Cretaceous tortoises: Cope, 71s, 72v  
crocodile: Harlan, 24a  
Eocene: Cope, 72j  
Greensand: Leidy, 51e; Owen (R), 49  
Mullica Hill: Harlan, 25  
Newark rocks, dinosaur tracks: Woodworth,  
95  
New Mexico: Marsh, 78b  
Permian: Williston, 11b  
Permo-Carboniferous: Case, 12a  
Triassic: Huene, 15  
New species from West: Hay (O P), 10c  
Nomenclature: Marsh, 85a  
North Carolina, Sampson Co.: Cope, 69d  
Nothosaurops, South Dakota: Leidy, 70l  
Nova Scotia, Coal Measures: Lyell, 53a, b;  
Wyman, 53a  
Nyctodactylus: Williston, 02d, f, 03a  
Ogmodirus martini, Niobrara, Nebraska:  
Williston, 13e, 17b  
Ohio: Cope, 97  
Ojo Alamo, Kirtland, and Fruitland faunas,  
San Juan Basin: Gilmore, 16  
Oldest land reptiles: Matthew (W D), 09c  
Omosaurus: Lucas (F A), 02c  
Omphalosaurus, dentition: Merriam, 11d  
Ontario: Reinecke, 16  
Ornitholestes, Jurassic, Wyoming: Osborn,  
03a, 17a  
Ornitholestes, Struthiomimus, Tyrannosaurus:  
Osborn, 16a  
Ornithomimus: Osborn, 16c  
Alberta: Lambe, 04a  
Denver group: Cannon, 91  
Ornithopoda, Jurassic: Marsh, 94d  
Ornithosauria, Cretaceous, Kansas: Cope, 72f  
Ornithostoma: Langley, 03; Lucas (F A), 02  
mandible, Kansas: Williston, 95b

## Reptilia—Continued.

- Ornithostoma: restoration: Williston, 97b  
skull, Kansas: Williston, 96  
Osteogenesis, Cretaceous: Moodie, 16b  
Osteopygis: Cope, 68c  
Ostodolepis brevispinatus, Texas, Permian  
Williston, 13  
Otocoelus: Cope, 96g  
Palaeoconus appalachianus: Cope, 77w  
Palaeophis, Monmouth Co., N. J.: Cope, 68d  
Palcorhinus: Lees, 07a  
Pantylus, cotylosaurian: Broom, 13b; Texas:  
Mehl, 12  
Parciasaurus, Conemaugh series, W. Va.:  
Case, 17a  
Pariotichus: Case, 99; skull: Branson, 11  
Pelycosauria: Baur, 99; Broili, 04b; Broom, 14b;  
Case, 02a, 03b, 04b, 07a, 10, 11b; Watson  
(D M S), 16a; Williston, 11  
classification: Williston, 11a  
columella auris: Cope, 85b  
four-horned from Texas Permian: Matthew  
(W D), 08c  
mandible: Williston, 13c  
morphology of skull: Baur, 97  
North America and South Africa: Broom, 10  
Pennsylvania, Newark group: Lea, 51; Phoe-  
nixville: Cope, 66a  
Pennsylvanian near Pittsburgh: Raymond  
(P E), 07a, 08b  
Pittston, tracks: Lacoc, 82  
Pottsville, footmarks: Lea, 50  
Triassic: Cope, 78j  
Permian: Cope, 78zf, 88c; Williston, 18a  
New Mexico: Cope, 78y  
Texas: Case, 03a; Cope, 83i; Williston, 13b;  
and New Mexico: Williston, 15b  
Permian Reptilia, with restorations: Case, 08c,  
osteology: Williston, 16  
Phylogeny and classification: Osborn, 05g  
Williston, 17a  
Phytosaur, Palisades: Huene, 13  
Phytosauria: McGregor, 04, 06  
Placrias, Triassic, Arizona: Lucas (F A), 04  
Platecarpus, Kansas: Williston, 98b, 99  
mounted: Williston, 10b  
Wyoming: Loomis, 15  
Plesiosaur, Jurassic: Knight (W C), 95a  
Plesiosauria: Cope, 94; Williston, 03, 06a, 07  
evolution and distribution: Williston, 08d  
food habit: Williston, 93a  
propodial: Moodie, 11c  
skull, structure: Williston, 90d, 03c  
stomach stones: Brown (B), 04; Eastman,  
04d; Williston, 04d  
Plesiosaurus, Cretaceous, Kansas: Williston,  
97d; food: Cope, 72p  
Plesiosaurus (Polyptychodon) mexicanus: Wie-  
land, 10b  
Pleistocene Reptilia of Maryland: Hay (O P),  
06c  
Pleurocoelus: Lucas (F A), 04e  
Podokesaurus, Triassic, Connecticut Valley:  
Talbot, 11; restoration: Shufeldt, 16a  
Poebrotherium, osteology: Scott (W B), 91b  
Poecilospondylus francisi: Case, 10b



## Reptilia—Continued.

- Poposaurus gracilis*, Triassic, Wyoming: Mehl, 15a  
*Porthochelys*, Cretaceous, Kansas: Williston, 01  
 Primitive reptiles: Williston, 12b; structure: Case, 98b  
*Probaena*, Jurassic, Colorado: Hay (O P), 03b  
*Proceratops*, n. n. for *Ceratops*: Lull, 06  
*Prosaurolophus*, Red Deer River: Brown (B), 16  
*Protostega*: Case, 97a; Cope, 72g; Hay (O P), 98; Wieland, 98; Williston, 02c; osteology: Wieland, 06  
*Protostega gigas*: Hay (O P), 95a  
*Protosteginae* plastron: Wieland, 06a  
*Protostegidae*, revision: Wieland, 09  
*Pteranodon*, Eaton (G F), 03a; Marsh, 76d, h, 84c; Matthew (W D), 16b  
     Kansas: Williston, 91  
     osteology: Eaton (G F), 10  
     skull: Eaton (G F), 08  
*Pterodactyls*: Marsh, 72a, 76h, 81c, 84c  
     Cretaceous: Marsh, 71d  
     fingers: Williston, 04c  
     Jurassic: Marsh, 78d  
     Kansas: Williston, 92  
     nomenclature: Marsh, 72e  
     wing finger: Williston, 11d  
     wings: Marsh, 82  
*Pterosauria*: Huene, 14a; Kansas: Marsh, 72a  
*Pterosphenus*, Eocene, Alabama: Lucas (F A), 98  
*Pythonomorpha*: Cope, 69, 71h, 72b, n, 78a; Cretaceous, Kansas: Merriam (J C), 94  
 Quebec, Potsdam sandstone: Owen (R), 51a  
 Relations to birds: Baur, 84a  
 Restorations of Permo-Carboniferous forms: Williston, 14a; of sauropod dinosaurs: Holland, 10  
*Rhinosaurus*: Marsh, 72f, h  
*Rhynchocephalia*, Triassic: Cope, 87d  
*Rhynchocephalian* reptile, Jurassic, Wyoming: Gilmore, 09a  
 River reptiles, titanotheres beds: Loomis, 04  
*Rutiodon*, Triassic, Pennsylvania: Sinclair, 18  
 Saskatchewan: Cope, 75l  
*Sauranodon*: Cope, 79i; Marsh, 80b  
*Sauranodonta*, Jurassic, Rocky Mountains: Marsh, 79  
 Saurian from the Niobrara: Wieland, 09a  
 Saurian remains within fish: Eastman, 11b  
 Saurians, Dakota formation: Cope, 78n; Laramie formation: Baur, 91b  
*Saurodontidae*: Cope, 71d  
*Saurischia*: Huene, 14b  
*Saurolophus*, Edmonton Cretaceous: Brown (B), 13b  
*Sauropoda*: Marsh, 79b, 98f; Osborn, 04b  
     forearm: Osborn, 04k  
     Morrison formation: Lull, 15a  
     specific characters: Mook, 17  
     systematic position: Huene, 08c  
     Wyoming: Osborn, 01  
*Sauropsida*, phylogenesis: Baur, 87b  
*Sauropsidae*: Baur, 95b  
*Sauropterygia*, necks: Cope, 79e

## Reptilia—Continued.

- Serpents, Wyoming: Marsh, 71b  
*Seymouria*, restoration: Williston, 11c  
 Shells of turtles: Hay (O P), 02c  
*Sphenacodon*, New Mexico: Williston, 16c  
*Sphenodon*: Baur, 95b; Osborn, 00c  
*Sphenosaurus*: Agassiz (L), 49  
 Squamosal bone, mosasaurs: Broom, 13  
*Stegocephala*: Baur, 86a  
*Stegoceras*: Lambe, 03b, 18  
*Stegomus*, Triassic, Connecticut Valley: Emerson, 04b; Marsh, 96b  
*Stegopelta landerensis*, Wyoming: Williston, 05  
*Stegosauria*: Marsh, 77e; Morrison formation: Lull, 15a  
*Stegosaurus*: Gilmore, 12b, 14, 18; Lucas (F A), 02c; Marsh, 87b, 92f  
     armor: Lucas (F A), 10; Lull, 10c  
     Lower Cretaceous; South Dakota: Lucas (F A), 01b  
     restoration: Gilmore, 15; Marsh, 91c  
*Stegosaurus unguulatus*, recently mounted: Lull, 10d  
 Sternum, origin: Williston, 16d  
 Stomach stones: Moodie, 12a  
*Streptosauria*: Cope, 69  
*Struthiomimus*: Osborn, 17a  
*Stylemys*, California: Sinclair, 03  
*Styracosaurus*: Lambe, 13c  
*Synapsida*: Osborn, 03  
 Synonymy: Bush, 03  
 Synopsis: Cope, 70  
*Teleorhinus*, Cretaceous, Montana: Osborn, 04e  
 Ten years' progress: Case, 12  
 Tertiary: Cope, 84; Marsh, 71c; descriptions: Marsh, 72j  
*Testudinata*: Baur, 91a; Cope, 86s; Marsh, 90d  
     ancestry: Cope, 96f  
     marine, classification: Wieland, 02  
*Testudinate* humerus: Wieland, 00a  
*Testudines*: Hay (O P), 05  
*Testudo*: Lambe, 06b; Miocene, Colorado: Hay (O P), 04d  
*Testudo hayi*, Florida: Sellards, 16c  
*Tetrapoda*, Permian: Williston, 16a  
     skull elements: Huene, 13a  
     structure of brain case: Watson (D M S), 16  
 Texas, Permian: Broili, 04; Case, 10a; Cope, 78l, 81, 81f; Williston, 10, 10c  
*Thalattosauria*, Triassic, California: Merriam (J C), 04a, 05b, e, 12  
*Thalottosaurus*, skull: Merriam (J C), 16g  
 Theridont reptiles: Gregory (W K), 10b  
*Theromorpha*, relations to Mammalia: Cope, 85d  
 Theromorphous brain: Cope, 86b  
 Theromorphous Reptilia: Cope, 78zd, zg  
 Theropoda: Marsh, 84b  
*Thescelosaurus*, Lance formation, Wyoming: Gilmore, 15b  
*Thoracosaurus*: Leidy, 52f  
*Titanosaurus*: Marsh, 77b  
*Tomistoma*, Florida: Sellards, 15b, 16c  
*Torosaurus*: Marsh, 92  
 Tortoise, Jurassic, Utah: Gilmore, 16b; Miocene, Colorado: Hay (O P), 05h



## Reptilia—Continued.

- Tortoises: Baur, 91a; Cope, 70b, 87a; Hay (O P), 02a  
 Cretaceous: Cope, 69e  
 Nebraska: Leidy, 52h  
 Tertiary: Hay (O P), 99  
 Toxochelyidae: Hay (O P), 05a  
 Toxochelys: Case, 98a; Wieland, 02, 05; and Chisternon: Hay (O P), 09a  
 Fort Pierre, Kansas: Wagner, 98  
 Kansas: Cope, 73ze  
 Toxochelys latiremis: Hay (O P), 96  
 Trachodon: Gilmore, 15c; Lambe, 18a  
 integument: Osborn, 12d  
 Laramie beds, Wyoming: Sternberg, 09  
 skeleton: Osborn, 09b  
 Trachodon group: Brown (B), 08b  
 Trachodon annectens: Lucas (F A), 04c  
 Trachodont, the duck-billed dinosaur: Brown (B), 08a  
 Trachodontidae: Hatcher, 02c; classification: Brown (B), 14c; osteology of manus: Brown (B), 12a, 13e; Lambe, 13a  
 Triassic: Cope, 70n; Huene, 14b; Wiman, 16  
 Atlantic region: Cope, 70j  
 California: Merriam, 95  
 Connecticut Valley: Lull, 15  
 Ichthyosauria: Merriam (J C), 08, 08b  
 New Mexico and Arizona: Mehl, 15b  
 Triceratops, Iguanodon, and Megalosaurus: Hay (O P), 09  
 Triceratops: Brown (B), 06; Hay (O P), 09; Lucas (F A), 02e; Lull, 03; Marsh, 89d, e, 90, 90b, 91a, d, 98  
 brain cavity: Burekhardt, 92  
 Montana: Beasley, 03a  
 mounted skeleton: Schuchert, 05b  
 osteology: Brown (B), 06  
 restoration: Marsh, 91b  
 Triceratops prorsus, Converse Co.: Gilmore, 05a  
 Trinacromerum: Williston, 08b; Cretaceous, Kansas: Cragin, 88, 91b  
 Trionychidae, Bridger beds: Hay (O P), 04c  
 Trionyx, Cretaceous, Alberta: Lambe, 02b; Wyoming: Leidy, 73a  
 Turtles: Hay (O P), 04, 06, 06a, b, 07, 07c; Lambe, 06c; Wieland, 06, 06a  
 Bridger basin: Hay (O P), 07c  
 composition of shells: Hay (O P), 02c  
 Cretaceous, Alberta: Lambe, 14a; New Jersey: Wieland, 04  
 descriptions: Hay (O P), 08, 10c  
 Harrison beds: Loomis, 09  
 John Day Basin, Oreg.: Hay (O P), 03a  
 Judith River beds, Montana: Hay (O P), 04a  
 Lance formation, Wyoming: Gilmore, 16c  
 New Jersey: Leidy, 56o  
 North America: Hay (O P), 08d, 09b; Williston, 08f  
 Uinta formation: Gilmore, 16a  
 Wyoming: Leidy, 71b, f; Oligocene: Lambe, 13b  
 Turtles and plesiosaurs, relationship: Moodie, 08  
 Tylopoda, phylogeny: Scott, 91b  
 Tylosaurus, Marsh, 72h; Osborn, 99, 99f; extremities: Williston, 97f

## Reptilia—Continued.

- Typothorax: Cope, 75u  
 Tyrannosaurus: Brown (B), 15, 15a; Osborn, 05, 06, 16c, 17a; restoration: Osborn, 13  
 Tyrannosaurus and Allosaurus: Osborn, 12c  
 Varanosaurus, Permian pelycosaur, Texas: Williston, 10e  
 Wasatch beds: Loomis, 07a  
 Winged reptiles: Williston, 02g  
 Wyoming: Gilmore, 13; Leidy, 70b, s, 73a  
 Eocene turtles: Cope, 73zh  
 Fort Pierre shale, Platecarpus: Loomis, 15  
 Green River basin: Cope, 73k  
 Jurassic: Knight (W C), 00b  
 Niobrara Co., Lance fauna: Lull, 15c  
 Triassic: Williston, 04a  
 Xenochelys: Hay (O P), 06  
 Xerobates, Loup Fork beds, Kansas: Gilbert (J Z), 98  
 Republic district, Wash.: Lindgren, 14a  
 Reseau triangulaire: Green (W L), 77  
 Resins, fossil: Hunt, 74c; Costa Rica: Michaud, 11; in Paleozoic coals: White (D), 09c; in Paleozoic plants: White (D), 14  
 Restorations.  
 Aceratherium fossiger, Kansas: Williston, 94  
 Agriochoerus, tree-climbing ruminant: Matthew (W D), 11b  
 Amphibia, Permian: Case, 11a  
 Anchisaurus: Marsh, 93b  
 Araucoscelis, Texas, Permian: Williston, 14c  
 Archeosigillaria: Clarke (J M), 14  
 Aves: Marsh, 96a  
 Baptornis: Brown (B), 10a  
 Basilosaurus cetoides: Gidley, 10  
 Brachyceratops: Gilmore, 17  
 Brontops: Marsh, 89  
 Brontosaurus: Marsh, 83a, 96a; Matthew (W D), 05b  
 Brontotherium: Osborn, 14b  
 Camarasaurus: Mook, 14a  
 Camptosaurus: Marsh, 94, 96a  
 Canis dirus, Rancho La Brea: Matthew (W D), 16a  
 Carboniferous swamp: Knowlton, 98d  
 Castoroides, Indiana: Moore, 93  
 Cephalopoda: Clarke (J M), 14; Devonian: Cleland, 07  
 Ceratosaurus: Marsh, 92g, 96a  
 Claosaurus: Beecher, 01c, 02c; Marsh, 92g  
 Clathropteris: Berry, 18o  
 Cordaites: Dawson, (J W), 90a  
 Coryphodon: Marsh, 93c  
 Corythosaurus: Brown (B), 16a  
 Devonian fishes: Clarke (J M), 15  
 Diadectes: Case (E C), 07  
 Diadectes phaseolinus: Case, 10a  
 Diaptosauria: Osborn, 03  
 Diatryma, Wyoming: Matthew (W D), 17e  
 Diceratherium arikarensis: Barbour (E H), 09c  
 Diceratops: Lull, 05b  
 Dimetrodon incisivus: Case, 15b  
 Dinoceras mirabile: Emerton, 87; Marsh, 81f  
 Dinocerata: Marsh, 85  
 Dinosaurs: Beard, 01; Lull, 11; Marsh, 93e, 95a, c, 96; Matthew (W D), 10d; Osborn, 11



## Restorations—Continued.

- Diploceras, Uinta Eocene: Peterson, 14  
 Diplodocus: Abel, 10; Hatcher, 01; Holland, 10; Hutchinson, 17; Stremme, 09; Tournier, 10  
 Dolichorhynchus: Williston, 02  
 Edaphosaurus: Case, 14a, 18  
 Eldonia, Middle Cambrian holothurian: Clark (A H), 13  
 Elephant: Osborn, 14c  
 Elotherium: Marsh, 94a  
 Embolophorus: Case, 03  
 Eotitanops: Osborn, 14b  
 Equus scotti: Troxell, 15  
 Eryops: Matthew (W D), 11c  
 Eurypterida: Clarke (J M), 14  
 Fishes (fossil): Dean, 11  
 General: Hutchinson, 92, 94; Lucas (F A), 01, 01a; Marsh, 95b; Osborn, 98p, 99c, 05e; Scott (W B), 13a; Washburne (Carleton W), 16  
 Hesperornis: Brown (B), 10a  
 Hoplophoneus occidentalis: White River beds: Riggs, 96a  
 Horses, Yale collection: Lull, 13  
 Hyaenodon: Scott (W B), 95a, f  
 Labidosaurus: Williston, 17  
 Laosaurus: Marsh, 96a  
 Leptauchenia decora: Sinclair, 10a  
 Limnoscelis: Williston, 12a  
 Loup Fork fauna: Scott (W B), 90a  
 Loxolophodon: Cope, 73t; Hill (F C), 81; Osborn, 81  
 Mammalia: Marsh, 96a; Osborn, 01a, 10  
 Mammalia and Reptilia, Black Hills region: O'Harra, 10  
 Mammoth: Matthew (W D), 15d  
 Man, paleolithic: Lull, 10b  
 Mastodon: Clarke (J M), 03b; Marsh, 92h; Matthew (W D), 15d; Osborn, 14c  
 Megacerops: Lull, 05a  
 Megalocnus: Matthew (W D), 18d  
 Mesonyx: Scott (W B), 88a  
 Methods: Osborn, 14b  
 Monoclonius: Brown (B), 17, 17a  
 Moropus: Matthew (W D), 18c  
 Mosasaurs, Kansas: Williston, 97g  
 Mylodon, Texas: Lull, 15b  
 Neocalamites: Berry, 18b  
 Nyctodactylus: Williston, 02f  
 Nyctosaurus: Williston, 11d  
 Oreodon culbertsonii: Stewart (A), 97  
 Ornithostoma (Pteranodon): Lucas (F A), 02; Williston, 97b  
 Oxyaena: Wortman, 00a  
 Palaeaspis: Claypole, 92a  
 Palaeosyops: Earle, 92  
 Paramys delicatus: Matthew (W D), 10a  
 Permian reptiles: Case, 11  
 Permian vertebrates, osteology: Williston, 16  
 Permo-Carboniferous amphibians and reptiles: Case, 15; Williston, 14a  
 Permo-Carboniferous vertebrates, New Mexico: Case, 13a  
 Phenacodus primaevus: Osborn, 97j, 98o  
 Pisces (Scaumenacia): Hussakof, 12  
 Plantae, Tertiary: Berry, 171

## Restorations—Continued.

- Platecarpus, mounted: Williston, 10b  
 Platygonus, Kansas: Williston, 94d  
 Podokesaurus holyokensis: Shufeldt, 16a  
 Poebrotherium: Scott, 91b  
 Promerycochoerus, Nebraska: Peterson, 14d  
 Protorohippus: Osborn, 01c  
 Pteranodon: Eaton (G F), 03a, 10; Matthew (W D), 16b  
 Rancho La Brea quadrupeds: Matthew (W D), 13e  
 Reptilia: Ballou, 97, 98; Lull, 04b; Marsh, 96a; Osborn, 97g; Williston, 14  
 Rhamphorhynchus: Marsh, 82  
 Rocky Mountain region quadrupeds: Osborn, 96a  
 Saber-toothed cats: Williston, 98e  
 Sequoia: Berry, 05e  
 Seymouria: Williston, 11c  
 Sidneyia inexpectans: Burling, 17b  
 Sphenacodon, New Mexico: Williston, 16c  
 Stegosaurus: Gilmore, 14, 15, 18; Marsh, 91c, 96a  
 Stegosaurus ungulatus: Lull, 10c  
 Steneofiber fossor: Jennings (O E), 05  
 Stenomylus: Peterson, 12a  
 Stenomylus hitchcocki: Peterson, 11a  
 Struthiomimus: Osborn, 16a, 17a  
 Stylonurus: Beecher, 00a  
 Tertiary mammals: Scott, 13  
 Thescelosaurus, Lance formation, Wyoming: Gilmore, 15b  
 Tiger, sabre-toothed: Matthew (W D), 16c  
 Titanotheres: Gregory (W K), 12c  
 Trachodon: Osborn, 12d; Shimer, 14a  
 Triassic, Connecticut Valley: Lull, 12b, 15, 17a  
 Triceratops: Beasley, 03a; Lucas (F A), 02e; Marsh, 91b, 96a  
 Tylosaurus: Osborn, 99  
 Tyrannosaurus: Osborn, 13, 16a  
 Vertebrata: Osborn, 98m; Shufeldt, 89  
 White River fauna: Scott (W B), 87, 90a  
 Rhinosaurus: Marsh, 72h  
 Rhizocarps, Paleozoic: Dawson (J W), 84d  
 Saccamina eriana, Kelly's Island, Ohio: Dawson (J W), 81f  
 Rhode Island.  
 Aquidneck Island (Rhode Island): Shaler, 72  
 Block Island: Eaton (G F), 98; Hollick, 98d  
 General: Providence Franklin Soc., 87  
 Geological survey: Rhode Island, 76  
 Miocene boulders, fossiliferous, Block Island: Shimer, 16  
 Narragansett Valley: Salisbury (C M), 81  
 Report of survey: Brown (C W), 10  
 Economic geology.  
 Anthracite: Ashley, 14, 15; Barbour, 52; Brown (C W), 10, 10a; Emmons (A B), 85; Griffith, 06; Hitchcock (E), 53a, b, e; Holley, 77; Jackson, 40; Johnson (W R), 41d; Meade (W), 27; Ridgway, 70; Shaler, 99; Silliman, 26; Stevenson, 95; Anon, 14  
 Building stone: Shaler, 84a  
 Cement materials: Eckel, 13  
 Clay: Shaler, 96  
 General: Jackson, 40  
 Granites: Dale, 08a; Kemp, 99c



**Rhode Island—Continued.***Economic geology—Continued.*

Iron: Holley, 77; Cumberland: Wadsworth, 81b; Iron Mine Hill: Johnson (B L), 08  
Mineral resources: Brown (C W), 10

*Historical geology.*

Aquidneck (Rhode Island): Hitchcock (C H), 61b; Shaler, 72  
Basic rocks, correlation and relationships: Hawkins, 15a  
Block Island: Hollick, 96a, c; Marsh, 96c; Merrill (F J H), 96a  
Coal field: Hitchcock (E), 53a  
Coal Measures: Clark (E F), 84; Hitchcock (C H), 61c  
Conanicut Island: Collie, 95; Crosby, 97a; Pirsson, 93a  
Cumberland, Iron Mine Hill: Johnson (B L), 08  
Diamond Hill-Cumberland district: Warren (C H), 14  
General: Dale, 83; Emerson (B K), 17; Jackson, 40; Providence Franklin Soc., 87  
Geologic map: Hitchcock (C H), 60e  
Green schists and associated granites and porphyries: Emerson, 07  
Igneous rocks: Hawkins, 18  
Iron Hill boulder train: Shaler, 93a  
Narragansett Basin: Lahee, 12a; Loughlin, 14b; Shaler, 99  
Narragansett Bay: Dale, 85  
Newport, "Paradise" rocks: Dale, 84, 84a  
Newport area: Crosby, 86c  
Newport Neck: Crosby, 97a  
Woonsocket Basin: Schrader 96

*Mineralogy.*

Amethyst: Adams (J), 24; Burrillville: Battey, 86a  
Calcite: Schaller, 08a; lamellar: Hawkins, 16  
Crocidolite, Cumberland: Chester (A H), 87  
Fibrous quartz: Hawkins, 18c  
General: Davis (C A), 05; Providence Franklin Soc., 87  
Hortonolite, Cumberland: Warren, 08b  
Iron Mine Hill: Warren, 08  
List of minerals: Dale, 87  
Providence: Webb, 22  
Quartz after prochlorite, Cranston: Emerson, 07a  
Quartz crystals, Centerdale: Hawkins, 18a  
Rhodonite, Cumberland: Chester (A H), 88  
Rocks and minerals, catalog: Jackson, 87  
Yenite (ilvaite): Troost, 23a, 25a: Cumberland: Torrey, 23

*Paleontology.*

Block Island: Hollick, 98  
Brachiopoda in Carboniferous quartzite pebbles: Walcott, 98b  
Carboniferous: Packard (A S), 89, 89a, 98a, 00; flora: Lesquereux, 84b, 89  
Cretaceous flora: Hollick, 06  
Crustacea, Coal Measures near Pawtucket: Haynes, 13  
General: Jackson, 40; Providence Franklin Soc., 87  
Insecta, Carboniferous: Scudder, 93b

*Petrology.*

Basic rocks, correlation and relationships: Hawkins, 15a

**Rhode Island—Continued.***Petrology—Continued.*

Conanicut Island: Collie, 95; Pirsson, 93a  
Cumberland gabbro: Warren (C H), 08a  
Diamond Hill-Cumberland district: Warren (C H), 14  
General: Dale, 83  
Granite: Emerson, 00a; Kemp, 99c  
Hortonolite, Cumberland: Warren (C H), 08b  
Igneous rocks: Hawkins, 18  
Intrusive granites in southwestern R. I.: Loughlin, 10a  
Iron Mine Hill: Warren (C H), 08  
List of rocks: Dale, 87  
Orbicular granite, Quonochontogue Beach: Kemp, 94d  
Ottrelite schist, Newport: Wolff, 90  
Narragansett Basin: Lahee, 12a  
Peridotite, Cumberland: Wadsworth, 81b  
Rocks and minerals, catalog: Jackson, 87  
Schists, granites, and porphyries: Emerson, 07

*Physical geology.*

Champlain submergence, Narragansett Bay region: Fuller, 98a  
Dikes, Newport: Crosby, 86c  
Metamorphic rocks: Jackson, 48  
Metamorphism, coal measures: Dale, 85a; Narragansett Basin: Lahee, 14a  
Newport, "Paradise" rocks: Dale, 84a  
Pebbles, distortion: Hitchcock (C H), 68f  
Puddingstone pebbles, Purgatory: Lyman, 67a

*Physiographic geology.*

Block Island: Hollick, 98d; drift: Rand, 90  
Eskers: Woodworth, 94c  
Gaspee Point, cusped foreland: Brown (R M), 02b  
General: Davis, 96c  
Glacial deposits: Fuller, 99  
Glacial stages: Fuller, 06h  
Kames: Battey, 86  
Moraines, terminal: Upham, 79  
Narragansett Bay: Shaler, 75f  
Quaternary, Narragansett Bay region: Woodworth, 96  
Queen's River moraine: Woodworth, 96b  
Wash plains: Woodworth, 98

*Underground water.*

General: Crosby, 04a, 05  
Rhombodictyon: Whitfield, 86a  
Rhythms: Barrell, 17; and geologic time: Gilbert, 00  
Rice Lake gold district, Mani.: Harding, 14; Wallace (R C), 13b  
Richmond coal-bearing rocks, age: Rogers (W B), 55  
Richmond folio, Ky. (no. 46): Campbell (M R), 98  
Richmond series, Batostomas: Cumings, 12b  
Rico folio, Colo. (no. 130): Cross, 05a  
Rico Mountains, Colo: Cross, 00; Ransome, 01  
Riddles quadrangle, Oreg: Kay, 08, 08a  
Rifted relict-mountain: Clarke (J M), 15c  
Rifting in granite: Tarr, 91  
Rigaud Mountain, Que: LeRoy, 01  
Rigidity of the earth: Michelson, 14  
Rill channels: Hudson, 12  
Rilly, a fossil lake: Berry, 17m  
Ringgold folio, Ga.-Tenn.: (no. 2): Hayes, 94  
Ringing-rock phenomena: Wherry, 12c  
Rio Grande embayment, Tex: Udden, 07



Rio Grande valley, N. Mex.: Gordon (C H), 07, 07a;  
Henderson (J), 13; Lee (W T), 07b, c

Rio Mora: Keyes, 10m

Ripple mark.

Beaches in Cincinnati group: James (J F), 85

Bedford and Berea formations, Ohio: Hyde, 11a

Cambrian and Ordovician: Kindle, 14d

Formation: Johnson (D W), 16

General: Bucher, 16; Cox (G H), 16; Dodge, 94a;

Epry, 14; Gilbert, 80b, 84c; Jaggar, 94;

Johnson (D W), 16; Kindle, 12c, 14d, 17,

17e; Spurr, 94e; Udden, 16c

"Giant ripples," formation: Bucher, 17a

Huronian quartzite, Cobalt, Ont.: Hore, 13i

Indiana, Franklin Co., Ordovician: Shannon, 95

Jefferson Co., Ordovician: Culbertson, 03

Richmond, Ordovician: Moore (J), 02

Kansas: Wooster, 84b

Limestone, Ohio: Prosser, 16a

Massachusetts, Brookline: Cabot, 50

Medina: Gilbert, 99c

New York, Keeseville: Wyman, 66; Port Leyden quadrangle: Miller (W J), 10

Richmond group: Foerste, 17

River capture. *See* Stream capture.

River spacing and base-leveling: Shaler, 99d

River waters, analyses of: Daly (R A), 09

Rivers.

Black Warrior: Smith (E A), 80

Classification: Davis (W M), 90a

Colorado River: Powell, 75; consequent origin: Jefferson, 97

Columbia River: Symons, 82

Connecticut: Hobbs, 01c; Still rivers: Hobbs, 01b

Deflection: Daly (R A), 01a; due to earth's rotation: Cobb, 93

Diversion of watercourses by rotation of earth: Gilbert, 85b

Earth's rotation and stream erosion: Eakin, 15f

Flood plains: McGee, 91e

Flow, laws: Tutton, 02

General: Brigham (A P), 92; Hicks, 91a; Shaler, 88f

Green River, origin: Emmons (S F), 97c; Hills, 91c

Hudson River: Kemp, 12a

Illinois, Des Plaines Valley: Goldthwait, 09

Kansas, Wakarusa Creek: Todd, 11a

Life history of a river: Haworth, 09

Lost rivers: Harrington (M W), 85

Loup Fork rivers: Davis (W M), 92c; Hicks, 92, 92a

Meander belts, limiting width: Jefferson, 02

Meandering valleys: Davis (W M), 14a

Minnesota River: Warren (G K), 75

Mississippi: Ballou, 80; Brown (R M), 02; Humphreys, 61; Thomassy, 60a

age: Fultz, 95a

ancient: Spencer (J W), 83b

bars: Suter, 78

deflection: Bowman, 04a

geologic age of channel: Humphreys, 76

lower, origin: Griswold, 95a

sedimentation at mouth: Hilgard, 10

silting: Atwood, 17b

Rivers—Continued.

Missouri River: Brower (J V), 96

age: Upham, 04c; West, 83

Pleistocene history: Todd, 14

Tertiary history: Bauer, 15

upper: Ward (L F), 84b

New Jersey: Davis (W M), 90a

Niagara River, life history: Pohlman, 83

Noatak, Alaska: Smith (P S), 13d

North America: Russell, 98

Ohio River: Grimsley, 10; James (J F), 91b

Osage River, Missouri: Winslow, 93c

River action phenomena: Todd, 01

Russian River, California: Holway, 13

St. John River, New Brunswick, history:

Bailey (L W), 83; outlets: Matthew (G F), 94d

St. Lawrence River, scour, and lowering of Lake Ontario: Spencer (J W), 16b

Scaurs, Rouge River: Jefferson, 04

Tennessee River, Tertiary history: Johnson (D W), 05

Underfit rivers: Davis (W M), 14a

Wisconsin, meandering rivers: Kummel, 95

Work of rivers: Lighton, 88

Yampa River, history: Hancock, 15

Road materials.

Alabama: Prouty, 11

Composition and structure: Lord, 16

Florida: Sellards, 08, 11c; sandstone deposit: Baker (T R), 93

General: Lord (E C E), 07; Shaler, 95

Georgia: McCallie, 10, 10a

Iowa: Beyer, 14

Maine: Leighton, 08; Rockland quadrangle: Bastin, 08a

Maryland: Clark (W B), 99

Massachusetts: Shaler, 95a; Whittle, 98a

New Jersey: Lewis (J V), 07e; Philadelphia district: Bascom, 09a

Nonbituminous: Reinecke, 18

Oklahoma: Gould, 08d, 10c; Snider, 11a

Ontario: Reinecke, 16a, 17, 17a

Oregon: Parks (H M), 12

Pennsylvania: Ihlseng, 00; Philadelphia district: Bascom, 09a

Petrographic range: Berkey, 13a

Quebec: Reinecke, 16a, 17, 17a; Vaudreuil Co.: Picher, 18

South Carolina: Sloan, 08

Tennessee, Camden chert: Ashley, 11c

Texas: Hill (R T), 89b; Nash, 15

United States: Shaler, 95a

Washington: Landes, 11

West Virginia, Marshall, Wetzel, and Tyler cos.: Hennen, 09

Wisconsin, limestone road materials: Hotchkiss, 14

Roan Mountain folio, Tenn.—N. C. (no. 151): Keith, 07b

Robinson copper district, Nev.: Lawson, 06

Rochester district, Nev.: Schrader, 14c

Rochester quadrangle, N. Y.: Hartnagel, 07b

Rochester shale Bryozoa: Bassler, 06a

Rock-boring animals, geological significance: Barrows, 17

Rock cleavage: Leith, 05



- Rock decay: Pumpelly, 91  
 Rock disintegration: Pumpelly, 79  
 Rock fissure: Gilbert, 95f  
 Rock flowage: Van Hise, 98a  
 Rock glaciers: Capps, 10a  
 Rock markings: Dawson (J W), 90b; Herrick (F H), 83  
 Rock-salt beds, formation: Ochsenius, 88  
 Rock-scorings: Chamberlin (T C), 88  
 Rock slides. *See* Landslides.  
 Rock sliding, glacial: Jones (C C), 07  
 Rock streams: Howe, 09; Veta Mountain, Colo.: Patton, 10  
 Rockford shales, Iowa: Webster, 89c  
 Rock-forming minerals: Clarke (F W), 08; key for the determination: Johannsen, 08  
 Rocking stone, New Hampshire: Moore (J B), 23; Potter, 33; North Providence, R. I.: Mason, 25; Roxbury, Mass.: Porter (J), 23; Savoy, Mass.: Porter (J), 25; Warwick, R. I.: Taylor (S), 24  
 Rockland folio, Me. (no. 158): Bastin, 08a  
 Rocks and rock minerals: Pirsson, 08  
 Rocks, alteration: Steidtmann, 08  
 Rocks. *See* Igneous and volcanic rocks; Sedimentary rocks.  
 Rocks, origin.  
     Augite andesite and related ultrabasic rocks: Daly (R A), 08  
     General: Leith, 13  
 Rocks, rock weathering, and soils: Merrill (G P), 97  
 Rocks, structural features.  
     Absence of joint structure at great depths: Crosby, 81b  
     Analyses: Clarke (F W), 84, 86, 87, 89, 90  
     Anomalous dips: Shaw (E W), 18d  
     Arizona, Grand Canyon, peculiar stratification: Blandy, 93b  
     Australites: Moore (E S), 16  
     Basalt, structure: Mallet, 75  
     Beach structure in Medina sandstone: Fairchild, 01b  
     Bedding in so-called metamorphic rocks: Dana (J D), 84c  
     Breccia: Lawson, 13; classification: Norton, 17  
     Brecciation, St. Louis limestone: Van Tuyl, 16g  
     Burrows, Paleozoic: Dawson (J W), 90b  
     Carbonaceous schists, Lake of the Woods: Greenland, 13  
     Cementing materials of sandstone: Jackson, 57b  
     Channel fillings in Devonian shales: Williams (H S), 81b  
     Chert in Burlington limestone, origin: Tarr (W A), 17  
     Cleavage: Becker, 93a; Dale, 92a; Rogers (H D), 50d; Van Hise, 96, 96d  
         Appalachian slates: Rogers (H D), 45c  
         slaty: Becker, 96  
         theories of: Barrell, 07; Becker, 07a; Willis, 07f  
     Columnar structure in limestone: Kindle, 14c; in subaqueous clay: Salisbury, 85  
     Compressibility of rocks: Adams (F D), 06, 06a  
     Concentric lamination: Hunt, 73g  
     Cone-in-cone: Gresley, 94a; Keyes, 96o; Newberry, 85k; White (C A), 68f  
     Contorted strata, Gold River district, N. S.: Willis, 98  
 Rocks, structural features—Continued.  
     Contortions of laminae: Brooks (T B), 73b  
     Crescentic fractures of glacial origin: Lahce, 12  
     Crystallized sands, Potsdam sandstone: Young (A A), 82a  
     Current ripples: Bucher, 17  
     Cylindrical structure in Potsdam sandstone: Hough, 51  
     Deformation: Van Hise, 96; under pressure: Adams (F D), 98d; of unconsolidated beds: Kindle, 17b  
     Diluvial striae: Stoddard, 59  
     Dip and strike of fissure veins: Williams (A), 92  
     Dolomitization, depth: Van Tuyl, 18a  
     Epsomites: Marsh, 68b  
     Exfoliation of rocks near Gettysburg, Pa.: Frazer, 75g  
     Faulting in veins: Church, 92; Emmens, 92b; Emmons (S F), 92; Gresley, 92a; Ricketts, 92; Wilson (E B), 92  
     Fissility: Van Hise, 96, 96d  
     Flexibility, limestone: Winslow, 92b  
     Flexure of rock: Ashley, 93  
     Flow and fracture: Hoskins, 96  
     Flow of rocks: Adams (F D), 12b  
     Fluorspar, etc., in limestone: Dana (J D), 46a  
     Foliated crystalline rocks: Trueman, 12  
     Foliation in pre-Cambrian rocks of Adirondacks, origin: Miller (W J), 16b  
     Formation of rocks: Maclure, 18a, 32  
     Fossil frost cracks: Udden, 95, 18  
     Fractured boulders in conglomerate: Campbell (M R), 06a  
     Friction and limiting strength of rocks: King (L V), 17  
     General: Cox (G H), 16; Dana (J D), 78b; Niles, 71a  
     "Giant ripples," formation: Bucher, 17a  
     Gneisses, origin and classification: Gordon (C H), 01  
     Gneissic foliation: Lawson, 86  
     Grain of rocks: Lane, 98  
     Granitization of Huronian schists: Bell (J M), 06  
     Gravitational assemblage in granite: Gilbert, 06b  
     Green Mountain region: Dale, 96, 02  
     Gypsum, Albert Co., N. B.: Bailey (L W), 12  
     Holocrystalline granitic structure: Williams (G H), 87c  
     Hornblende enlargement: Van Hise, 87  
     Ice crystals, fossil: Udden, 18  
     Igneous rocks: Grout, 18b  
     Indicia of dip in rocks: Logan, 18a  
     Interference ripples: Kindle, 14c; Silliman (jr), 51a  
     Internal friction during deformation: Adams (F D), 17a  
     Intraformational conglomerate and breccia, Shreveport, La.: Emerson (F V), 16  
     Joint planes: Sheldon (P), 12  
     Joint structure: Crosby, 86b  
     Joint system of southwestern Wisconsin: Harder, 06  
     Jointing: Crosby, 83, 88c; Van Hise, 96; New Albany shale, Ind.: Culbertson, 12a  
     Lamination of acid lavas: Iddings, 87  
     Lignilites: Marsh, 68b



## Rocks, structural features—Continued.

- Lithophysae: Iddings, 87  
 Magmas, origin from pelitic rocks: Hobbs, 13b  
 Magnetic polarity of trap rocks: Hitchcock (E), 45c  
 Marine clastics, diagnostic characteristics: Kindle, 17c  
 Maryland, granites: Keyes, 95i  
 Massachusetts, Connecticut Valley: Shepard, 67a  
 Mud-crack limestone, Devonian: Fenton, 18  
 Mud cracks: Moore (E S), 14b; Nova Scotia: Kindle, 14c  
 Mud flow markings: Whitfield, 00  
 New Red sandstone (Newark): Barratt, 45a  
 Occlusion of igneous rock within metamorphic schists: Julien, 04a  
 Oolites and spherulites: Bucher, 18  
 Oolites in shale, origin: Tarr (W A), 18b  
 Ophitic texture: Lane, 07f  
 Orbicular and concretionary structure, origin: Blake (W P), 05b  
 Paleozoic limestones reef deposits: Brown (C T), 16  
 Pebbles, concretions, and conglomerate in veins: Halse, 05  
 Peculiarly marked sedimentary rock: Talmage, 95a  
 Pele's tears: Moore (E S), 16  
 Phenomenon in hematite: Gresley, 92  
 Plastic deformation of Grenville limestone, Port Henry region: Newland, 18  
 Plasticity: Adams (F D), 17a; of pebbles: Blake (W P), 70; of rocks: Gibbs, 71  
 Plicated cleavage foliation: Dale, 92a  
 Porosity of oil sands: Shaw (E W), 18c  
 Porphyritic structure: Dana (J D), 86d  
 Primary and secondary structures: Van Hise, 95d  
 Quartz pebbles in conglomerate, origin: Brainerd, 53a  
 Rain drops, so-called, origin: Desor, 50a  
 Red color, origin: Russell, 89a  
 Rhythmic banding of manganese dioxide in rhyolite tuff: Tarr (W A), 18a  
 Rifting in granite: Tarr (R S), 91  
 Rill channels: Hudson, 12  
 Ripple mark: Kindle, 17c; Udden, 16c; New York: Hough, 52  
 Rock cleavage: Leith, 05  
 Rock-boring animals, geologic significance: Barrows, 17  
 Sandstones, grains in part crystalline: Young (A A), 82  
 Schistose cleavage: Lawson, 86  
 Schistose structure: Dana (J D), 43  
 Schistosity: Becker, 96, 04; by crystallization: Wright (F E), 06c  
 Schists, differential thermal conductivity: Thelen, 05  
 Schists and gneiss, formation: Hitchcock (E), 61d  
 Sedimentary rocks, classification: Grabau, 04a  
 Serpentine in fossiliferous rocks: Dawson (J W), 79h  
 Siliceous oolites, origin: Moore (E S), 12  
 Siliceous rocks, origin: Derby, 98  
 Slate: Dale, 99

## Rocks, structural features—Continued.

- Slaty cleavage: Becker, 04  
 Sorting in sedimentary rocks: Shaw (E W), 17b  
 Spheroidal structure: Ransome, 93  
 Spherulites: Iddings, 87; Yellowstone Park: Parkinson, 01a  
 Strains in rocks: Becker, 93a; Niles, 76; Stead, 06  
 Strand markings, Portage group: Clarke (J M), 18b  
 Stratification: McNair, 12; in gneiss, Philadelphia: Rand, 80e  
 Stress in rocks: Reade, 91a  
 Stretched pebbles from Ocoee conglomerate, Georgia: McCallie, 06  
 Striation by river ice: Todd, 92  
 Stylolitic structures in limestone, origin: Irving, 04a; in Tennessee marble, origin: Gordon (C H), 18a  
 Texture of massive rocks: Becker, 87a  
 Textures and structures, classification: Crosby, 82  
 Vein systems in Percé: Clarke (J M), 18c  
 Veinlets in sedimentary rocks, origin: Taber (S), 17b  
 Veins in asbestiform serpentine: Merrill (G P), 05a  
 Wave marks: Bucher, 17; Foerste, 95  
 Rock Springs coal field, Wyo.: Schultz, 09, 10  
 Rocky Mountain protaxis: Dana (J D), 90f  
 Rocky Mountain region: Geikie, 79; Boule, 93; Hayden, 68c; Marcou, 58d; Peale, 77b; in Canada: Dawson (G M), 91a; Hector, 61; lake basins, ancient: Marsh, 75; physiographic methods of correlation: Lee (W T), 17c; middle Paleozoic stratigraphy: Tomlinson, 17  
 Roemer, F. von, biography: Simonds, 02a  
 Roentgen ray in paleontology: Field, 15a  
 Rogers, H. D., biography: Gregory (J W), 16; Anon, 96a  
 Rogers, W. B., biography: Mendenhall (T C), 97; Rogers (W B), 96; Walker (F A), 95  
 Rogersville folio, Pa. (no 146): Clapp (F G), 07b  
 Rogue River coal field: Diller, 09  
 Rome folio, Ga.-Ala. (no. 78): Hayes, 02  
 Rominger, C. L., biography: Merrill (G P), 08a  
 Romingeria: Beecher, 03; Sardeson, 03a  
 Romney formation, Md.: Prosser, 04a  
 Romney oil field, Ont.: Coste, 07  
 Roseburg folio, Oreg. (no. 49): Diller, 98  
 Rossland district: B. C.: Brock, 06; Drysdale, 15a  
 Roswell area, N. Mex.: Fisher (C A), 06b  
 Rotation of earth, geological effects: Todd, 83  
 Rounded sands of Paleozoic formations: Van Ingen, 05  
 Round Mountain, Nev.: Ransome, 09b  
 Routt Co. coals, Colo.: Headden, 07  
 Rowe, R. B., biography: Prosser, 02c  
 Roxbury conglomerate: Mansfield, 06a; Sayles, 10  
 Rubidium: Browning, 17  
 Ruby district, Alaska: Eakin, 13a  
 Ruby Creek district, Alaska: Maddren, 09, 12  
 Ruby-Kuskokwim region, Alaska: Mertie, 16  
 Rudistae, Cretaceous, Jamaica: Whitfield, 97b  
 Rural Valley folio, Pa. (no. 125): Butts, 05a  
 Rusophycus: Dawson (J W), 64a  
 Russell, I. C., biography: Davis (C A), 06a; Gilbert, 06c; Lane, 18; Leverett, 06c; Lombard, 06; Pirsson, 06a; Willis, 08



**Russell Fork coal field, Ky.:** Stone (R W), 07a, 08  
**Russellville iron district, Ala.:** Burchard, 07a; Sawyer, 14  
**Russian River, Cal.:** Holway, 13  
**Rutile.** *See also* Titanium.  
     United States, eastern: Watson, 14  
     Virginia: Catlett, 07; Hess, 10e; Watson, 07d, e, 10c, 13g; Anon, 09a  
**Saba:** Sapper, 03h  
**Saccamina:** Dawson (J W), 89d  
**Saccharoidal sandstone:** Broadhead, 04c  
**Sacramento folio, Cal. (no. 5):** Lindgren, 94a  
**Safford, J. M., biography:** McGill, 17; Stevenson, 09a  
**Saganaga syenite, age:** Selwyn, 92; Winchell (H V), 91  
**Saginaw oil field, Mich.:** Smith (R A), 13  
**St. Albans, Vt.:** Edson, 06a  
**Saint Anthony Falls:** Sardeson, 08  
**Saint Bartholomew:** Spencer (J W), 01b; Echinoidea: Cotteau, 74, 75  
**St. Bruno Mountain, Que.:** Dresser, 06e, 10a  
**St. Christopher.**  
     General: Sapper, 03f; Spencer (J W), 01c  
     *Mineralogy.*  
     Anorthite: Fels, 03  
**St. Croix.**  
     General: Cleve, 71; Hovey (S), 38; Quin, 07  
     *Paleontology.*  
     Pleurodonte debooyi: Bartsch, 18  
**St. Eustatius:** Molengraaff, 86; Sapper, 03b  
**St. Francis Valley, Que.:** Dresser, 06  
**St. Helens district, Wash.:** Winchell (H V), 12a; Zapffe, 12a  
**St. Joe River basin, Idaho:** Collier, 06a; Pardee, 11  
**St. John fauna:** Walcott, 84  
**St. John group:** Matthew (G F), 93f  
**St. Lawrence Valley, surface geology:** Chalmers, 08  
**St. Louis formation, Iowa:** Gordon (C H), 95c  
**St. Louis limestone, brecciated character:** Gordon (C H), 90b  
**St. Louis quadrangle:** Fenneman, 11  
**St. Lucia:** Hovey, 06h; Sapper, 03d  
**St. Martin:** Molengraaff, 88; Spencer (J W), 01b  
**St. Marys folio, Md.-Va. (no. 137):** Shattuck, 06a  
**St. Peter sandstone:** James (J F), 94; Sardeson, 96a; origin: Trowbridge, 17a  
**St. Thomas:** Hornbeck, 41  
**St. Vincent.**  
     General: Sapper, 03c, 1; Spencer (J W), 02  
     *Petrology.*  
     Products of eruptions of the Soufrière: Flett, 08  
     Tuffs, Soufrière: Howe, 03  
     Volcanic ash, Soufrière: Coppock, 03; Diller, 02c; Flett, 02; Klein, 02  
     Volcanic rocks: Diller, 02d; Hillebrand, 02a; basic enclosures: Lacroix, 03g  
     *Physical geology.*  
     Erosion phenomena: Hovey, 04c  
     Soufrière: Anderson (J), 85; Anderson (T), 08; Davis (H), 49; Hovey, 09g; Sharp, 90  
     changes since eruption: Anderson (T), 08b  
     eruption 1812: Huggins, 02  
     eruptions 1902: Anderson (T), 02, 03, 03a, 07; Bergeat, 02; Curtis, 03a; Deckert, 03; Geinitz, 02; Hovey, 2d, e, f, g, 03c, 04i, j, 05g; Jaggar, 02a, b; Lacroix, 03, 03c, d, j; Russell, 02c; Sapper, 03k, 1; Stübel, 03  
     in 1903: Hovey, 03d; in 1904: Hovey, 04h; present condition: Hovey, 15c

# St. Vincent—Continued.

## *Physical geology—Continued.*

    Striations and U-shaped valleys: Hovey, 09  
     Volcanic phenomena: Curtis, 03  
     Wallibu and Rabaka gorges: Hovey, 09d  
**Salamander from Carboniferous:** Moodie, 10  
**Salem limestone:** Weller, 08a; southeastern Iowa: Van Tuyl, 12  
**Salem limestone fauna:** Beede, 06; Cumings, 06  
**Saline domes.** *See* Salt domes.  
**Saline lakes.** *See* Soda lakes.  
**Saline-Gallatin coal field, Ill.:** DeWolf, 07  
**Saline Township meteorite:** Farrington, 03b  
**Salines.**  
     California, Death Valley: Young (G J), 18  
     Searles Lake: Dolbear, 14  
     southeastern: Gale, 14g  
     Great Basin region: Young (G J), 14  
     Louisiana and Texas, origin: Norton, 15  
     Mexico, lakes: Virlet d'Aoust, 65  
     Nevada, Silver Peak Marsh: Dole, 13  
**Salisbury iron ores:** Hobbs, 07d  
**Salmon River district, B. C.:** McConnell, 12a  
**Salt.**  
     California, desert dry lakes: Bailey (G E), 04  
     Canada: Denis, 03c  
     Coastal salt domes: Kennedy, 17  
     Form of salt deposits: Hahn (F F), 12  
     Formation and geology: Jones (F), 02  
     General: Hovey, 04m; Merrill, 87a; Phalen, 08d; Turrentine, 13; Van Rensselaer, 23; Wyatt, 87  
     Gulf coastal region: Hager, 04  
     Louisiana, Avery's Island: Romeyn, 1  
     Five Islands: Veatch (A C), 99  
     northern: Veatch (A C), 02  
     Manitoba, saline springs: Cole (L H), 14  
     Mexico: Zarate, 17; Lower California, Ojo de Liebre: Wittich, 16c  
     Michigan, Detroit district: Sherzer, 17  
     Migration: Kindle, 18a  
     Occurrence, history, and manufacture: Hayward, 08  
     Oil fields, origin of brines: Reeves, 17a  
     Origin: Branson, 15a; Cole, 15; Grabau, 13a, 18c; Harris, 09; Hubbard (L L), 95; Rogers, (H D), 51b; Thomas (K), 18b  
     Origin of rock-salt deposits: Newberry, 88i  
     Salton Sea deposits, origin: Blake (W P), 08  
     Separation from saline water and mud: Kindle, 18a  
     Southern States: Phalen, 14c  
     United States: Phalen, 17a; Schnabel, 13; U S G S, 83; Ward (T), 90  
     Virginia, southwestern, origin: Thomas (K), 18  
**Salt Creek oil field, Wyo.:** Jamison, 12a; Wegemann, 11  
**Salt domes.**  
     Accumulation of oil in salt domes: Jones (W F), 18b  
     Cap rock, origin: De Golyer, 18c  
     General: Hawkins, 18d  
     Origin: Dumble, 18b; Hopkins (O B), 17; Matteson, 18; Norton, 15; Rogers (G S), 18a; Shaw (E W), 17e; Thomas (K), 18b; Washburne, 14a  
     intrusive origin: Rogers (G S), 18a  
     volcanic origin theory: De Golyer, 18b  
     Structure: Lucas (A F), 18



Salt Lake oil field, Los Angeles, Cal.: Arnold, 06c

Salt lakes, origin: (H D), 50b

Salt marshes: Shaler, 85

Saltiness of the sea: Shelton, 10

Salton Sea: MacDougal, 14, 15, 16

Salvador.

Western Salvador: Sapper, 04b

*Economic geology.*

General: Fleury, 17; Schmidt, 55

San Sebastian mine: Wuensch, 17a

*Historical geology.*

General: Burkart, 69b; Dollfus, 68

San Sebastian mine: Wuensch, 17a

*Petrology.*

Volcanic rocks: Hague, 86

*Physical geology.*

Earthquake and volcanic phenomena, 1879-80:

Goodyear, 80a

General: Burkart, 69b; Dollfus, 68

Mud volcanoes: Sapper, 96b

Volcanic activity, recent: Wuensch, 17

Volcanoes: Dollfus, 68; Sapper, 00

Cosiguina, eruption: Caldcleugh, 36

Izalco: Gosling, 97; eruption: Koep, 69; 1902:

Sapper, 03a, 04

Quetzaltepeque, eruption: Lacroix, 17

San Savador, eruption: Friedlaender, 18b;

June 1917: Friedlaender, 18a; Powers, 18a

*Physiographic geology.*

General: Burkart, 69b; Dollfus, 68

Samwel cave, Cal.: Furlong, 06

San Clemente Island: Smith (W S T), 98

San Cristobal copper district: Garrison, 07b

Sand. *See also* Glass sand; Silica; and names of States.

Bibliography: Hopkins (L L), 18

Canada: Cole, 17a

Character of grains: Grabau, 10

Crystallized sands, Potsdam sandstone: Young (A A), 82a

General: Stone (R W), 16a

Glass sands: Fettke, 17

Microscopic examination: Julien, 85a

Mineralogical analysis: Tomlinson, 15

Molding sands: Cole (L H), 17, 18; Eckel, 03f

New York, Albany molding sand: Newland, 15, 15a, 16b

Sonorousness: Bolton, 90a; Julien, 88

United States: U S G S, 83

Sand-calcite crystals: Barbour, 02b

Sand crystals: Barbour, 01

Sand dunes, genetic system: Haltenberger, 13

Sand dunes of Indiana: Bailey (E S), 17

Sand formations on marine coasts: Olsson-Seffer, 10

Sand grains, types of: Sherzer, 10; classification of:

Grabau, 11; rounding of: Ziegler, 11a

Sand plains, Massachusetts, Lake Sudbury: Goldthwait, 05

Sand waves: Hider, 83; Lawes, 11

Sand waves and their work: Willey, 08

Sand-filled vein: Clarke (J M), 07b

Sand-lime brick.

Illinois: Parr, 12

Ohio: Peppel, 05

West Virginia: Grimsley, 06

Sandstone. *See also* Building stone and names of States.

Sandstone—Continued.

Canada: Cole (L H), 17a, 18a

Catahoula sandstone, Texas, origin: Goldman, 15

Genesis: Newberry, 70j

Grains, crystalline: Young (A A), 82

Saltsburg sandstone: Brown (S B), 18

United States: Bowles, 17; U S G S, 83

Sandstone concretions, formation: Merrill (G P), 94a

Sandstone dikes.

Black Hills: O'Harra, 10

California: Diller, 90

Colorado, Colorado Springs quadrangle: Finlay (G I), 16; Ute Pass: Crosby, 95, 97c

General: Diller, 90

Georgia: McCallie, 03a

New York, Erie Co.: Grabau, 00b

Sandusky formation, Ohio: Swartz, 07a

San Franciscan volcanic field, Ariz.: Robinson, 13

San Francisco district, Ariz.: Martin (A H), 09

San Francisco district, Cal.: Lawson, 14

San Francisco district, Utah: Butler (B S), 13, 13a, 14a

San Francisco earthquake. *See* California.

San Francisco folio, Cal. (no. 193): Lawson, 14

San Francisco Mountain region, Ariz.: Johnson (D W), 07b

San Francisco Peninsula: Crandall (R), 07a

Sangamon: Leverett, 98

Sangre de Cristo Range, Colo.: Bagg, 08a; Siebenthal, 07

San Joaquin Valley, Cal.: Mendenhall, 08b; geology and possible oil resources: Anderson (R), 12

San Juan district, Cal.: Anderson (F M), 14

San Juan district, Colo.: Atwood, 11a

San Juan Mountains, Colo.: Atwood, 12a; Hopkins (T C), 10b; Stevens (R P), 86; geographic history: Atwood, 16a; Howe, 06; glacial epochs: Atwood, 12c

San Juan oil field, Utah: Gregory (H E), 11; Woodruff, 12

San Lorenzo series, Cal.: Clark (B L), 18b

San Luis folio, Cal. (no. 101): Fairbanks, 04

San Luis Valley, Colo.: Siebenthal, 10

San Miguel formation: Cross, 98b

San Pablo formation, Cal.: Weaver, 09

San Pablo formation faunal zones, Cal.: Buwalda, 13

San Pablo group, Cal.: Clark (B L), 15

San Pedro Mountain, N. Mex.: Brinsmade, 08d

Santa Clara Valley, Cal.: Crandall (R), 07

Santa Clara Valley oil district, Cal.: Eldridge, 07

Santa Cruz folio, Cal. (no. 163): Branner, 09b

Santa Cruz Mountains, Cal.: Arnold, 08d

Santa Eulalia district, Chihuahua, Mex.: Merrill, (F J H), 09

Santa Fe marls: Cope, 74m

Santa Fe penepplain: Campbell (M R), 06

Santa Maria oil district, Cal.: Arnold, 07d

Santa Monica Mountains, Cal.: Arnold, 08i

Santa Rito (Chino), N. Mex., geologic and structural relations: Paige, 12d

Santo Domingo. *See* Dominican Republic.

Saponite: Owen (D D), 53a



**Sapphires.**

Idaho: Bell (R N), 07b

Montana: Dwight (A S), 95; Rowe, 09; Yogo:  
Freeman (O W), 15a

New Jersey, Sussex Co.: Fowler, 32

Sargent oil field, Cal.: Jones (W F), 11

**Saskatchewan.**

Amber, so-called, Cedar Lake: Harrington (B J), 91a

Amisk-Athapapuskow Lake area: Bruce, 16

Athabasca Lake-Churchill River region: Tyrrell, 96

Black Bay and Beaverlodge Lake areas:  
Alcock, 17Churchill River and South Indian Lake:  
McInnes, 09

Churchill River basin: McInnes, 13a

Eastern Sask.: Dowling, 00c

General: Bryce, 07; Dawson (G M), 85b; Hector, 61; Weston, 99a

Lac La Ronge district: McInnes, 10

Lake Athabasca region: Alcock, 15

Northern Sask.: Dowling, 93; Tyrrell, 93, 95

Pasquia Hills and lower Carrot River region:  
McInnes, 08

Saskatchewan River district: McInnes, 11

**Economic geology.**

Amisk-Athapapuskow Lake area: Bruce, 16, 18

Athabasca Lake, north shore: Camsell, 16b

Beaver Lake mining district: Bruce, 14b

Building and ornamental stones: Parks (W A),  
16Clay: Keele, 15a; southern Sask.: Davis (N B),  
18

Clay and shale deposits: Ries, 11, 12e, 13b

Coal fields: Denis, 12; Dowling, 07a, 09, 12a, e,  
17a; Dulieux, 10a

Cascade basin: Dowling, 09a

Lac La Ronge district: McInnes, 10

Souris River field: Dowling, 04a

Willowbunch area: Rose, 14a

Wood Mountain-Willowbunch area: Rose, 16  
Gold, Amisk Lake district: Bruce, 15, 18

Beaver Lake district: Bruce, 14b

northern Sask.: Bruce, 16a

Lignite: Dawson (G M), 74a, 81; Dowling, 09a  
southern Sask.: MacLean, 18

Wood Mountain area: Rose, 15a

Potash: Dowling, 18a

Southeastern Sask.: Dowling, 03; MacLean,  
17; Stansfield, 18

Shale: Kcele, 15a; Ries, 11

Willowbunch area: Rose, 14a

Wood Mountain-Willowbunch area: Rose, 16

**Historical geology.**

Amisk-Athapapuskow Lake area: Bruce, 16, 18

Amisk Lake district: Bruce, 15

Athabasca Lake, north shore: Camsell, 16b

Athabasca Lake-Churchill River region: Tyrrell, 96

Black Bay and Beaverlodge Lake areas:  
Alcock, 17

Boring, Carlton: Ells, 77

Churchill River basin: McInnes, 13a

Cypress Hills, Tertiary: Weston, 93

Cypress Hills-Wood Mountain region: McCon-  
nell, 85**Saskatchewan—Continued.****Historical geology—Continued.**

Eastern Sask.: Dowling, 00c

Forty-ninth parallel: Dawson (G M), 75

General: Bell (R), 74, 76; Billings, 59h; Collins  
(W H), 13c; Dawson (G M), 74a; Dowling,  
13; Hector, 59, 63; Hind, 59, 60; Malcolm,  
13; Selwyn, 74; Spencer (J W), 76

Lignite Tertiary formation: Dawson (G M), 81

Northern Sask.: Bruce, 16a

Souris River coal field: Dowling, 04a

Souris River valley, borings: Selwyn, 81

Southeastern Sask.: Dowling, 03; MacLean, 17;  
Stansfield, 18

Southern Sask.: MacLean, 18

Tertiary lignitic formation, forty-ninth parallel:  
Dawson (G M), 74

Willowbunch area: Rose, 14a, 16

Wood Mountains area: Rose, 15a, 16

**Paleontology.**Actinosepia, Cretaceous, South Saskatchewan  
River: Whiteaves, 98bCretaceous: Meek, 59; Whiteaves, 89b; plants:  
Dawson (J W), 88dMammalia, Swift Current River: Cope, 85k,  
89h

Reptilia: Cope, 75l

Tertiary plants: Dawson (J W), 81; Penhallow,  
03

Vertebrata, Cypress Hills: Lambe, 05, 08

Miocene: Ami, 91a

Swift Current River: Cope, 85, 89a

**Petrology.**

Amisk-Athapapuskow Lake district: Bruce, 18

**Physiographic geology.**Pleistocene, Lake Athabasca region: Tyrrell,  
93a

Wood Mountain-Willowbunch area: Rose, 16

Satsop formation, Oregon and Washington: Bretz, 17

Sauranodon: Marsh, 80b

Saurocephalus: Leidy, 57g

Saurocetus: Agassiz (L), 48

Saurischia: Huene, 14b

Saurolophus: Brown (B), 13b

Sauropoda: Marsh, 79b, 98f; Osborn, 04b

Sauropsida, phylogenesis: Baur, 87b

Sawatch Range, Colo., glaciation: Davis (W M), 05

Sawtooth quadrangle, Idaho: Umpleby, 14a

Scaphites: Smith (W D), 05

Scaphopoda. *See also* Mollusca.

Costa Rica, Pliocene: Pilsbry, 11

Dominican Republic, Tertiary: Pilsbry, 98a

Jamaica, Oligocene: Pilsbry, 11

Scapolite rocks: Spurr, 09

Scarps, Blue Ridge, North Carolina: Campbell  
(M R), 96c

Scenery, geology of: Merrill (F J H), 94

Schenectady quadrangle, N. Y.: Stoller, 11

Schistosity: Becker, 04; Wright (F E), 06c

Schists, crystalline. *See* Crystalline schists.

Schoharie Valley, N. Y.: Grabau, 06

Schoolcraft, H. R., biography: Anon, 90a

Schuyler copper mine: Granberry, 07

Scolithus: James (J F), 92c, d; Leidy, 82b

Scotts Bluff folio, Nebr. (no. 88): Darton, 03a

Scudder, S. H., biography: Cockerell, 11d; Anon,  
11b



Sea bottom material, examination of: Matson, 10  
 Sea caves, La Jolla, Cal.: Winsted, 13  
 Sea water, composition: Clarke (F W), 11  
 Searles Lake, Cal.: Gale, 14g  
 Seasons, Permo-Carboniferous: Sayles, 16  
 Secondary enrichment. *See* Ore deposits, origin.  
 Secular decay: Tarr, 92b  
 Secular increase of earth's mass: Winchell (A), 83a  
 Sedi-genetic ores: Bain, 06c  
 Sedimentary rocks. *See also* Petrology.  
   Catahoula sandstone, Texas, origin: Goldman, 15  
   Classification: Graham, 04a  
   Coal, structure: Jeffrey, 16  
   Connecticut: Barrell, 10  
   Criteria, for determining position: Cox, 16  
   Dolomite, origin: Van Tuyl, 16  
   General: Clark (W B), 88  
   Interpretation: Graham, 17b  
   Origin and age: Schaeberle, 08b  
   Petrologic characters: Grabau, 05  
   Petrology: Mook, 16  
 Sedimentation. *See also* Conglomerate; Erosion.  
   Abstraction of potassium during sedimentation: Watson (J W), 13  
   Accretion of flood plains by sand bars: Simpson (H E), 03  
   Adirondacks, lake filling: Smyth (C H), 93  
   Alaska, Solomon and Casadepaga quadrangles: Smith (P S), 10  
   Alluvial changes in southwestern Iowa: Todd, 07  
   Arid region: Russell, 89b  
   Arizona, southern bolson region: Tolman, 09a  
   Arkose deposits: Barton, 16  
   Atlantic coast sediments: Frazer, 76g; Lesley, 76d  
   Bacterial precipitation of calcium carbonate: Kellerman, 14, 15  
   Bahamas, bottom deposits: Vaughan, 15  
   Basin deposits, Rocky Mountain region: Davis (W M), 00g  
   Bermuda Islands: Verrill, 07  
   Bituminous matter in black shales, source: Orton, 83  
   Bituminous sediment, Schuylkill River: Leidy, 76c  
   Black shale, formation: Schuchert, 15b; Twenhofel, 15  
   Blue clay of Mississippi River: Little, 82  
   Bonneville Lake beds, origin: Keyes, 17e  
   Bottom currents: Kindle, 15b  
   Brown iron ores as cavity fillings: Eckel, 13a  
   Calcium carbonate deposition and bacteria: Kellerman, 15  
   California: Gilbert, 17  
     Owens Valley: Trowbridge, 11  
     Rancho La Brea asphalt bone beds: Stoner, 13  
     San Francisco Bay: Sumner, 14  
   Cambrian sedimentation: Burling, 15  
   Carboniferous of Licking Co., Ohio: Carney, 09  
   Catskill formation: Williams (H S), 00c  
   Cave-sandstone deposits: Purdue, 07  
   Channel fillings in Devonian shales: Williams (H S), 81b  
   Chemical composition for identifying metamorphosed sediments: Bastin, 09  
   Chemical deposits of the sea: Vaughan, 17b  
   Chemistry: Clarke (F W), 17

## Sedimentation—Continued.

Chesapeake Bay, mouth of Choptank River: Hunter, 14b  
 Circles of deposition: Newberry, 74c  
 Classification of sediments: Trowbridge, 14  
 Clastic sediments, mechanical composition: Udden, 14c  
 Climate and terrestrial deposits: Barrell, 08  
 Climatic types of sediments: Blackwelder, 17a  
 Coal, rate of deposition: Ashley, 07, 09b  
 Concretions, formation: Roddy, 15  
 Conditions: Willis, 93  
 Conglomerate, types of: Mansfield, 07  
 Conglomerate and sandstone of postglacial origin in Indiana: Culbertson, 11  
 Conglomerates, marine and terrestrial: Barrell, 09  
 Conglomerates, oolites, and sandstones, origin: Brown (E P), 13  
 Connate water in oil and gas sands: Shaw (E W), 15a  
 Contemporaneous deformation: Lahee, 14b  
 Continental clastics, characteristics: Blackwelder, 17a  
 Continental formations of Tertiary: Matthew (W D), 09  
 Cretaceous and Jurassic: Hatcher, 04  
 Criteria of continental deposits: Kindle, 11c  
 Cross-banding by current action: Woodworth, 01a  
 Cross-bedding: Grabau, 07d; White River formation, S. Dak.: Winchester, 13  
 Current deposition in continental seas: Bassler, 11g; Ulrich, 11b; Vaughan, 11a; Willis, 11a  
 Cycles of sedimentation: Williams (J L), 91  
 Deformation of unconsolidated beds: Kindle, 17b  
 Delta deposits: Barrell, 12a; Grabau, 12b; Paleozoic: Grabau, 13b  
 Delta of the Mississippi: Hilgard, 06b; McBeth, 05a  
 Deposition in arid regions: Keyes, 11i  
 Deposition of coal, rate of: Ashley, 07  
 Deposition under marine currents: Pillsbury, 11  
 Detrital slopes on mountains of the Southwest: Blake (W P), 07  
 Diatomaceous dust on Bering Sea ice floes: Kindle, 09b  
 Dirt storms: Hershey, 99  
 Esker fans, structure: Jaggar, 12  
 Experiments: Jaggar, 08  
 Flood-tide deposits: Davis (C H), 51  
 Floral evidence in marine strata: White (D), 11  
 Florida, southern, bottom deposits: Vaughan, 15  
 Fluvial and lacustrine beds, criteria for distinguishing: Davis (W M), 00c  
 Fluvial deposits: Davis (W M), 00a  
 Foreset beds and slope deposits: Chamberlin (T C), 13  
 Formation of sedimentary deposits: Wilson (A W G), 03b  
 General: Brewer, 85; Crosby, 94b; Gordon, (C H), 04b; Grabau, 13; Hilgard, 79; Mook, 16; Newberry, 70i; Rogers (H D), 58b; Steidtmann, 11; Udden, 14c; Verrill, 82; Weller, 11



## Sedimentation—Continued.

Glacial deposits: Scott (W B), 97d; classification: Woodworth, 99  
 Glacial drift: Upham, 99c  
 Graptolite shales, depth at which formed: Grabau, 17a  
 Gravel deposit: Eaton (A), 22a  
 Gravels, formation and distribution: Gregory (H E), 15a  
 Gulf coast, different types of sedimentation: Shaw (E W), 16b  
 Gulf Stream slope: Verrill, 83  
 Illinois, Peoria Lake, fluviatile deposits: Wilson (J D), 83  
 Lacustrine and fluviatile beds, criteria for distinguishing: Davis (W M), 00c  
 Lagoon formation, Nebraska: Hicks, 91  
 Lake deposits: Davis (W M), 00a; Wisconsin: Lapham, 47  
 Land deposits: Tolman, 09  
 Limestone, origin: Walcott, 14  
 Lithogenesis of sediments: Van Tuyl, 16h  
 Mackenzie River basin: Kindle, 18  
 Marginal sedimentation: Cotton, 18  
 Marine current deposition: Willis, 11a  
 Marine deposits, classification: Grabau, 13f  
 Marine sedimentation, character and magnitude: Clarke (F W), 12  
 Maryland, Upper Cretaceous: Goldman, 16  
 Mauch Chunk shale: Barrell, 07a  
 Mississippi River: Brown (A), 49; Humphreys, 70; Lyell, 47a; Pourtales, 70; bars: Suter, 78; mouth: Hilgard, 10  
 Missouri River: Todd, 78  
 Modified drift: Upham, 99c  
 Morrison formation: Mook, 15  
 Nova Scotia, lacustrine deposits: MacKay, 84, 85; Minas Basin: Bancroft (J A), 05  
 Ocean sediments: Pourtales, 71  
 Oceanic deposits, composition: Harrison (J B), 95  
 Old Red Sandstone, fluviatile origin: Barrell, 16  
 Oligocene and Miocene deposits of Great Plains, origin: Hatcher, 02d  
 Ontario, Burlington Beach: Van Wagner, 84  
 Organic deposits of the sea: Vaughan, 17b  
 Paleozoic limestones reef deposits: Brown (T C), 16  
 Parting in coal bed: Rogers (G S), 14b  
 Pebble deposits: Bragg, 12a  
 Pebbles, concretions, and conglomerate in veins: Halse, 05  
 Pennsylvania, Bradford oil sand, constitution: Ashburner, 80c  
 Physiographic processes: Fenneman, 09  
 Quartz pebbles in conglomerate, origin: Brainerd, 53a  
 Quartzites, formation: Keyes, 94k  
 Rate of accumulation: Heilprin, 88a  
 Rate of sedimentation: Walcott, 93; in California: Smith (J P), 10  
 Red beds: Knight (S H), 16; origin: Beede, 12a; Tomlinson, 16  
 Red clay, composition: Clarke (F W), 07  
 Red rocks, paucity of organic remains in: Newberry, 70e  
 River and flood deposits: Upham, 00c

## Sedimentation—Continued.

River deposits and climate: Barrell, 08  
 River sediment: McGee, 07  
 Rock-salt beds, formation: Ochsenius, 88  
 Rocky Mountain region: Davis (W M), 00  
 Roxbury conglomerate: Mansfield, 06a  
 St. Vincent Island: Hovey, 09d  
 Salinity of ocean waters at Fowney Rocks, Fla.: Dole, 18  
 Salton Sea, Cal.: Macdougall, 17  
 Sand formations on marine coasts: Olsson-Seffer, 10  
 Sand grains, types of: Sherzer, 10  
 Sand waves in Mississippi River: Lawes, 11  
 Sandstone: Vail, 17  
 Schoharie Valley, N. Y.: Grabau, 06  
 Scorodite, deposition, Yellowstone National Park: Hague, 87  
 Sea deposits: Murray, 85  
 Sea water at Tortugas: Dole, 14a  
 Secular decay: Tarr, 92b  
 Sedimentary overlap, types of: Grabau, 07  
 Sedimentation, continental, littoral, and marine, relative geological importance of: Barrell, 06  
 Sedimentation and drainage: Dappert, 06  
 Shawangunk conglomerate, Ulster Co., N. Y.: Brown (T C), 14a  
 Shoal-water bottom samples: Vaughan, 18a  
 Siliceous stratified rocks, origin: Brainerd, 53a  
 Silting of Mississippi River: Atwood, 17b  
 Sorting of sediment: Shaw (E W), 17b  
 South Joggins deposits, Nova Scotia, rate of accumulation: Rogers (W B), 59c  
 Stratification, origin: Wells, 51  
 Synclines of deposition: Willis, 94  
 Tertiary, Cordilleran region: Matthew (W D), 15  
 Tidal scour: Frizell, 02  
 Transportation of débris by running water: Gilbert, 14  
 Transportation of detritus by Yuba River: Gilbert, 08b  
 Travertine deposit in Indiana: Wilson (G W), 06  
 Valley filling by intermittent streams: Parkins, 11  
 Volcanic dust and pumice in marine deposits: Shaler, 96d  
 Western rivers of U. S.: Stabler, 11  
 Wind erosion in the plateau country: Cross, 08a  
 Yakutat coastal plain of Alaska, formation of: Blackwelder, 09b  
 Seely, H. M., biography: Perkins (G H), 18  
 Segmentation of earth: Chamberlin (T C), 14b  
 Seismic geography of eastern United States: Hobbs, 07a  
 Seismic geology, evolution and outlook: Hobbs, 09  
 Seismology. *See also* Earthquakes.  
 Analysis of earthquake waves: Klotz, 18  
 California, measurements of earthquake monuments: Baird, 11  
 Canada: Stupart, 03  
 Collection of earthquake data: Humphreys, 17  
 Curves illustrating coincident volcanic, seismic, and solar phenomena: Huntington, 08



## Seismology—Continued.

- Distant earthquakes, observations of: Omori, 06b  
 Distribution in space of seismism: Owen (R), 89  
 Earthquake displacement, surface measurement of: McAdie, 11a  
 Earthquake intensity, San Francisco: Holden, 88  
 Earthquake intensity scales: Montessus de Ballore, 16  
 Earthquake motion: Taber (S), 11  
 Earthquake problem, western United States: Wood (H O), 16b  
 Earthquake sea waves: Reid (H F), 14a  
 Earthquake waves, transmission: Klotz, 18a  
 Earthquakes, seasonal distribution: Montessus de Ballore, 91  
 Energy of earthquakes: Reid (H F), 12  
 Epicenters: Klotz, 10c  
 General: Gerland, 99; Gutiérrez Lanza, 13; Klotz, 17b; McAdie, 15; Mendenhall (T C), 88; Owen (R), 83, 87; Palmer (A H), 15; Rockwood, 85, 86, 89; Schuster, 11  
 Horizontal pendulum: Denison, 13a  
 Intensity of earthquakes: Mendenhall, 89  
 Locating submarine faults: Klotz, 17c  
 Long-period deviations of horizontal pendulums: Varney, 10  
 Map for locating earthquakes: Joerg, 13  
 Masonry, resistance to vibration: Bierer, 11  
 Mass movement and depth of focus: Reid (H F), 10b  
 Mexico: Montessus de Ballore, 92; Muñoz Lumbier, 18  
 Microseismic motion: Burbank, 12  
 Microseismic movements: Benndorf, 11  
 Microseisms: Klotz, 10a; caused by frost action: Burbank, 12a  
 National bureau of seismology: Hobbs, 10d  
 Observation of earthquakes: Wood (H O), 11  
 Observations of the future: McAdie, 11  
 Perceptibility of weak earthquakes: Wood (H O), 14  
 Records, Albany station: Clarke (J M), 10  
   Canada: Klotz, 10c  
   Harvard seismographic station: Woodworth, 09, 12a  
   Mexico: Camacho, 10  
   Michigan, shocks recorded at Ann Arbor: Hussey, 11  
   Missouri, St. Louis University: Goesse, 11  
   Toronto: Stupart, 98  
   United States: Reid (H F), 05a  
   Utah, seismographs: Talmage, 07  
 Report of International Seismological Association: Klotz, 10b  
 Seismic and magnetic disturbances, relation: Hazard, 18  
 Seismic disturbances and coal mine explosions: Stow, 09  
 Seismic motion: Omori, 06c  
 Seismic movements and lunar culminations: Montessus de Ballore, 90  
 Seismograms: Carter, 09  
   Mexico, Tacubaya district, seismograms: Camacho, 10

## Seismology—Continued.

- Seismograph: Reid (H F), 01a, 12a  
 American Museum: Hovey, 12d  
 damping contrivance: Lemos, 17  
 determination of constants: Reid (H F), 13  
 improvements: Marvin, 06a  
 Marvin strong-motion seismograph: Davis (E F), 13a  
 new form for: Durand (W F), 10  
 universal: Marvin, 08  
 vertical motion: Perret, 13f  
 Seismograph records: Burbank, 05  
 Seismographic bookkeeping: Wood (H O), 12d  
 Seismographs, Alaska earthquakes: Martin (L), 10b  
   Kingston: Marvin, 07  
   North America and Hawaiian Islands: Reid (H F), 06a  
 Seismological committee's report: Reid (H F), 08  
 Seismological instruments: Reid (H F), 09b  
 Seismological notes: Reid (H F), 09b; Anon 12f  
 Seismometric bookkeeping: Wood (H O), 17a  
 Seismoscopes: Mendenhall (T C), 88  
 Starting point of earthquake vibrations: Reid (H F), 18a  
 Sun spots, relation to seismic and volcanic phenomena: Poey, 74  
 Tables: Klotz, 16  
 Teleseismic registration: Jaggar, 18b  
 Transmission curves: Reid (H F), 12e  
 Undagraph: Klotz, 13a  
 United States: Lawson, 11  
 Velocity of *L* waves: Klotz, 17a  
 Weather Bureau, work of: Palmer (A H), 15  
 West Indies: Montessus de Ballore, 04  
 Selkirk Range: Walcott, 91b  
 Selwyn, A. R. C., biography: Ami, 03, 05, 07a; Barlow, 02b; Woodward (H), 99  
 Semiprecious stones, United States: Reed (E A), 05  
 Sentinel Butte lignite field: Leonard, 09  
 Sepiolite: Helmhacker, 96  
 Septaria: Todd, 13a  
 Sequoia, California: Muir, 77  
 Serpentine.  
   General: Julien, 14  
   Georgia: McCallie, 10  
   Manhattan Island: Newland, 01  
   Origin: Benson, 18; Marsters, 05  
   Pennsylvania, Northampton Co.: Peck, 11  
   Staten Island: Hollick, 10c; Hunt, 83g  
   Texas, Llano and Burnet quadrangles: Paige, 12  
   Vermont: Jacobs (E C), 16a; Wigglesworth, 15  
 Serpentinization: Merrill (G P), 99  
 Sewanee folio, Tenn. (no. 8): Hayes, 94c  
 Seward Peninsula, Alaska: Collier, 08a; Knopf, 08; Moffit, 06a; Smith (P S), 08, 09, 12b, 13c  
 Sewickley quadrangle, Pa.: Munn, 11; oil and gas fields: Munn, 10  
 Shale.  
   Canada, western provinces: Ries, 14b  
   General: Ries, 00f  
 Shale oil: Mitchell (G E), 18  
 Shaler, N. S., biography: Davis (W M), 06e, f; Hobbs, 07g; Shaler, 09; Wolff, 08a  
 Sharon conglomerate, Ohio: Lamb, 11



**Shasta group:** Becker, 91b; White (C A), 85  
**Shasta-Chico series:** Diller, 94a  
**Shawangunk conglomerate, Ulster Co., N. Y.:**  
     Brown (T C), 14a  
**Shawangunk grit:** Billingsley, 10  
**Sheep Creek district, B. C.:** Gracey, 10  
**Sheet-flood erosion:** McGee, 97  
**Shefford Mountain, Que.:** Dresser, 02; petrography:  
     Dresser, 01c  
**Shelf seas:** Chamberlin (T C), 14a  
**Shell Bluff group:** Conrad, 66g; Hilgard, 66a  
**Shell mounds, origin:** Dumble, 88a; Heiderhoff, 88  
**Shenandoah limestone:** Prosser, 00b  
**Shepard, C. W., biography:** Anon, 95  
**Sherbrooke formation, British Columbia:** Burling,  
     12a  
**Sheridan coal field, Wyo.:** Simmons, 12a; Taff, 09  
**Shifting of faunas:** Williams (H S), 03a  
**Shinarump conglomerate:** Gregory (H E), 13  
**Shinarump group:** Cross, 08  
**Shinumo quadrangle, Ariz.:** Noble, 14  
**Shoal Creek limestone:** Udden (Jon A), 08  
**Shoal-water bottom samples:** Vaughan, 18a  
**Shore ice:** Case (E C), 06  
**Shore lines. See also Beaches: Terraces.**  
     Atlantic coast: Meinhold, 04; Shaler, 95d;  
         barrier beaches: Merrill (F J H), 90b  
     Arctic regions: Nansen, 04  
     Beach cusps: Jefferson, 99; Woodman, 99a;  
         origin: Branner, 00; Johnson (D W), 08,  
         10c; wave-formed, Lake George, N. Y.:  
         Comstock (F M), 00  
     Beach sands: Shaler, 94c  
     Contraposed: Clapp (C H), 13a  
     General: Johnson (D W), 14c; Miller (M), —  
     Massachusetts: Gulliver, 04  
         Nantasket beach: Johnson (D W), 10d  
         Nantucket: Barnard (C), 99; Gulliver, 09  
         Scituate-Marshfield region: Johnson (D W),  
             11b  
         Winthrop area: Roorbach, 10  
     New Brunswick, Bay of Fundy: Chalmers,  
         93a; Quaco: Whittle, 91a  
     Shore-line topography: Gulliver, 99  
     Strand-line movements, factors in: Barrell, 15;  
         Vaughan, 15c  
**Shores, fossil:** Todd, 96b  
**Shore lines (abandoned). See also Glacial lakes;  
     Terraces.**  
     Adirondacks: Taylor (F B), 97c  
     Algonquin and Nipissing beaches: Taylor (F B),  
         96a  
     Black Hills, Tertiary: Darton, 99e  
     Cause: Pearson, 04  
     Craighton Lake, tilted shore lines: Hubbard  
         (G D), 14a  
     Criteria for determination: Fairchild, 18  
     General: Chambers, 47  
     Georgian Bay to the Ottawa River: Hunter, 08  
     Great Lakes region: Gilbert, 97a, 98; Hill (E J),  
         94; Leverett, 95a; Spencer (J W), 90a, 91b,  
         94c; Taylor (F B), 95a, c, 96  
     Green Bay: Taylor (F B), 94a  
     Lake Agassiz: Leverett, 14d  
     Lake Erie, beaches and moraines: Leverett, 98b

# Shore lines (abandoned)—Continued.

    Lake Superior, south coast: Collie, 01; Taylor  
         (F B), 94b, 97e  
     Lundy Beach: Spencer (J W), 94d  
     Maine, Mount Desert Island: Shaler, 89a; Pleis-  
         tocene shore lines: Katz, 18, 18a  
     Michigan: Leverett, 17  
         Elsie and Perrinton quadrangles: Leverett,  
             18c  
         Mackinac Island: Taylor (F B), 92, 15  
     New Hampshire, Pleistocene shore lines: Katz,  
         18, 18a  
     New York, central: Fairchild, 99b  
     New York and New Jersey: Merrill (F J H), 90a  
     Nipissing beach, Ont., Lake Superior: Taylor  
         (F B), 95b  
     Ohio: Leverett, 95a  
         Ashtabula quadrangle: Carney, 16b  
         Oberlin quadrangle: Carney, 16a  
     Ontario, Blue Mountain escarpment: Hunter,  
         05  
         Georgian Bay region: Taylor (F B), 94c  
     Iroquois beach: Coleman, 99d; deformation:  
         Spencer (J W), 90b, c  
     Mackinac region: Taylor (F B), 95  
     Ottawa Valley: Ells, 94b; Taylor (F B), 96b  
     Toronto region: Gilbert, 88  
     Quebec, St. Lawrence Valley: Chalmers, 96a,  
         00; southeastern: Goldthwait, 14b  
     Warren and Algonquin beaches: Upham, 961  
     Wisconsin: Martin (L), 16  
**Shoshone group:** Cross, 09  
**Shumard, B. F., biography:** Winchell (N H), 89e  
**Shungnak region, Alaska:** Smith (P S), 11  
**Sidney lignite fields, Dawson Co., Mont.:** Stebin-  
     ger, 12  
**Sierra Almoloya, Mex.:** Hill (R T), 07  
**Sierra Nevada copper belt:** Knopf, 06  
**Sierra Nevada fault scarp:** Fairbanks, 98a  
**Sierra Nevada:** Diller, 86; Lindgren, 11; Reid (J A),  
     11; Turner, 96; elevation: Le Conte, 86;  
     geomorphogeny: Reid (J A), 11; southern:  
     Baker (C L), 12; structure: Becker, 91  
**Sierran:** Hershey, 02  
**Silica.**  
     Deposition: Lindgren, 17  
     Forms of: Fenner, 12  
     General: Katz, 13  
     Illinois: Bain, 07e; southern: Holbrook, 17  
     Maryland: Clark (W B), 09  
     Solution of: Hayes, 97  
     Virginia: Watson, 07e  
**Silicate liquids, differentiation:** Bowen (N L), 15  
**Silicates:** Clarke (F W), 91; classification: Hunt, 85b;  
     and nomenclature: Orton (jr), 01; consti-  
     tution: Clarke (F W), 95, 14  
**Silicic acid in waters of mountain streams:** Head-  
     den, 03  
**Silicification, Conception Bay, Newfoundland:** Bud-  
     dington, 16; California: Hunt, 80e  
**Silicification of fossils:** Bassler, 08; Hunt, 64b  
**Silicified woods:** Call, 91a  
**Silliman, Benjamin, biography:** Caswell, 77; Fisher  
     (G P), 66; Anon, 65  
**Silliman, Benjamin, jr., biography:** Hunt, 85d;  
     Wright (A W), 11; Anon, 80a, 85



Silurian. *For Lower Silurian see Ordovician.*

- Alabama: Smith (E A), 76  
 Birmingham district: Burchard, 10c; Butts, 10a  
 Birmingham region: Gibson, 93  
 Cahaba region: Smith (E A), 90a  
 Coosa Valley: Hayes, 94e  
 Gadsden quadrangle: Hayes, 96  
 northeastern: Hayes, 92  
 Stevenson quadrangle: Hayes, 95  
 Tennessee Valley: McCalley, 96  
 Alaska: Kindle, 08  
 Fairbanks quadrangle: Prindle, 13  
 international boundary: Cairnes, 14  
 Mount McKinley region: Brooks (A H), 11  
 Noatak-Kobuk region: Smith (P S), 13a  
 Norton Bay-Nulato region: Smith (P S), 11c  
 Porcupine River: Kindle, 08a  
 Port Clarence limestone faunas: Kindle, 11d  
 Rocky Mountains: Schrader, 02  
 Seward Peninsula: Collier, 08a; Kindle, 11d  
 southeastern: Kindle, 07; Smith (P S), 11c; Wright (F E), 08  
 southwestern: Spurr, 00  
 upper Yukon: Brooks (A H), 07e, 08a  
 Yukon-Tanana region: Prindle, 08  
 Alaska-Yukon boundary: Cairnes, 12a, 14b  
 Alberta, Rocky Mountain region: McConnell, 87  
 Alexandrian series: Keyes, 14, 15e; Savage, 14a  
 Illinois and Missouri: Savage, 13, 13a  
 northeastern Illinois and eastern Wisconsin: Savage, 15a, 16a  
 Anticosti Island: Twenhofel, 14  
 Arctic Archipelago: Haughton, 59  
 Arctic regions: Dawson (G M), 87a; Fielden, 78; McMillan, 10  
 Beechey Island: Woodward (H), 78  
 Ellesmere Land: Hortedahl, 14, 17  
 Arisaig series, Nova Scotia: McLearn, 18a  
 Arizona, Fort Apache region: Reagan, 03b  
 Arkansas: Williams (H S), 00a  
 Batesville district: Van Ingen, 01; Williams (H S), 94b  
 Benton Co.: Simonds, 94  
 Caddo Gap and De Queen quadrangles: Miser, 17  
 northern: Purdue, 07a; Ulrich, 04  
 Appalachian region: Rogers (H D), 57b  
 Basal Silurian formations, eastern North America: Schuchert, 15d  
 British Columbia, Field area: Allan, 14; Rocky Mountains: Allan, 13  
 California: Smith (J P), 10, 16  
 eastern: Ball (S H), 07; Spurr, 03  
 Sierra Nevada: Turner, 94a  
 Taylorville region: Diller, 92, 08  
 Canada: Ami, 00a, 01h; Logan, 63; Selwyn, 84  
 eastern: Dawson (J W), 88h  
 Hudson Bay region: Bell, 85d; Savage, 18a  
 maritime provinces: Matthew (G F), 08a  
 Cataract formation: Schuchert, 13f, 14a  
 Cincinnati anticline, southern Kentucky: Foerste, 02  
 Classification: Grabau, 09  
 Clinton formation: Clarke (J M), 10  
 New York: Chadwick, 18  
 Anticosti section: Ulrich, 18  
 Clinton group, Ohio: Foerste, 85

## Silurian—Continued.

- Colorado, Aspen district: Spurr, 98; Leadville district: Emmons (S F), 82, 86  
 Comparison of European and American: Grabau, 17d  
 Coralline limestone: Barrett, 78  
 Correlation: Grabau, 13b; Prosser, 16; Savage, 16a; America and Europe: Grabau, 17e  
 Devonian-Silurian boundary: Williams (H S) 00b  
 Edgewood limestone, Pike Co., Mo.: Rowley, 16  
 Eurypterids beds: Schmidt, 92  
 Evolution of North America: Grabau, 09a  
 Franklin: Low, 06  
 General: Castlenau, 43, 43a; Conrad, 40a; Foster, 41; Grabau, 17e; Hall, 42a, 67e, 71a, 72f; Hunt, 72a; Miller (S A), 81e; Schuchert, 13d; Sharpe, 48; Ulrich, 11a; Winchell (N H), 88g  
 Georgia: McCallie, 08a; Veatch (J O), 09  
 Catocsa Co.: Vogdes, 79  
 Coosa Valley: Hayes, 94e  
 northern: Maynard, 12  
 northwestern: Spencer (J W), 93  
 Ringgold sheet: Hayes, 94  
 Rome quadrangle: Hayes, 02  
 Greenland: Böggild, 17; northeastern: Nathorst, 01  
 Guelph formation: Nicholson, 75i  
 Helderberg formation, Mass., and Vt.: Dana (J D), 77c  
 Hillsboro sandstone, Ohio: Prosser, 16b  
 Idaho, eastern: Umpleby, 12  
 Lemhi Co.: Umpleby, 13  
 phosphate reserve: Richards (R W), 11b  
 Illinois: Bannister, 70; Daniels, 58c; Hall, 43c; Shaw (J), 73; Weller, 06a; Worthen, 66, 68a, 71, 73  
 Alexander Co.: Savage, 09  
 Alexandrian series: Savage, 13, 13a, 15a, 16a  
 Calhoun Co.: Weller, 07c  
 Cap au Gres: Keyes, 98n  
 Chicago district: Alden, 02; Burchard, 08a; Chicago: Hunt 71e  
 Cook Co.: Bannister, 68  
 Galena and Elizabeth quadrangles: Shaw (E W), 16; Trowbridge, 16  
 Girardeau and Edgewood formations: Savage, 10b  
 Jo Daviess Co., Elizabeth sheet: Cox (G H), 10  
 La Salle: Cady, 12  
 lead region: Whitney, 66c  
 Leclaire limestone: Worthen, 62  
 northern: Udden, 95  
 northwestern: Bain, 05a; Carman, 09; Cox (G H), 14  
 Orchard Creek shale: Savage, 18b  
 Peoria: Udden, 08c  
 Peoria quadrangle: Udden, 12  
 Rock Island: Udden, 96  
 southern: Savage, 10a  
 southwestern: Savage, 08, 08a  
 Wheaton quadrangle: Trowbridge, 12  
 Indiana: Beachler, 92; Cox (E T), 79; Foerste, 04, 04b; Hall, 43c; Leverett, 89a  
 Bartholomew Co.: Elrod, 82  
 Carroll Co.: Thompson (M), 92a  
 Cass Co.: Elrod, 94



## Silurian—Continued.

Indiana: Clark and Floyd cos.: Borden, 74  
 Clinton formation: Foerste, 96  
 Dearborn, Ohio, and Switzerland cos.: War-  
 der, 72  
 Decatur Co.: Elrod, 83  
 Delaware Co.: Phinney, 82  
 Fayette Co.: Elrod, 84  
 Franklin Co.: Haymond, 69  
 Grant Co.: Phinney, 84  
 Hamilton Co.: Brown (R T), 84a; Niagara:  
 Kindle, 02  
 Huntington Co.: Cox (E T), 76  
 Jasper Co.: Collett, 83b  
 Jay Co.: McCaslin, 83  
 Jefferson Co.: Borden, 75a; Culbertson, 16  
 Jennings Co.: Borden, 76  
 Kentland: Greene (G K), 98  
 Madison: Hubbard (G C), 92b  
 Madison Co.: Brown (R T), 84a  
 Miami Co.: Gorby, 89  
 Niagara group: Elrod, 02; Foerste, 98  
 northern: Schuchert, 04c; Niagara domes:  
 Kindle, 03, 04  
 Randolph Co.: Phinney, 83  
 Richmond: Plummer, 43  
 Ripley Co.: Borden, 76  
 Rush Co.: Elrod, 84b  
 St. Paul: Beachler, 91  
 Scott Co.: Borden, 75  
 Shelby Co.: Collett, 82a  
 southeastern: Foerste, 97, 00  
 southern: Newsom, 03  
 Wabash Co.: Elrod, 92  
 Waldron formation: Kindle, 09d; Price, 00  
 Wayne Co.: Cox (E T), 79  
 Iowa: Beyer, 07b; Calvin, 06c; Hall, 58; Keyes,  
 93a; Norton, 12; Tiffany, 83; White  
 (C A), 70  
 Bremer Co.: Norton, 06  
 Buchanan Co.: Calvin, 98a  
 Cedar Co.: Norton, 01  
 Cedar Rapids: Norton, 95d  
 Cedar Valley: Calvin, 96d  
 Clayton Co.: Leonard, 06  
 Clinton Co.: Udden (Jon A), 05  
 Delaware Co.: Calvin, 98  
 Dubuque Co.: Calvin, 00; Clinton formation:  
 Howell (J V), 16a  
 eastern: Carman, 09  
 Fayette Co.: Savage, 05b  
 Jackson Co.: Savage, 06a  
 Johnson Co.: Calvin, 97  
 Jones Co.: Calvin, 96  
 Lancaster quadrangle: Grant (U S), 07  
 Le Claire limestone: Calvin, 96a; Worthen, 62  
 Linn Co.: Norton, 95b  
 northeastern: McGee, 91; Norton, 95a; Wil-  
 son (A G), 95  
 Scott Co.: Norton, 99; Tiffany, 85  
 Winneshiek Co.: Calvin, 06  
 Kentucky: Foerste, 01; Lyon, 60b  
 Bath Co.: Linney, 86  
 central: Linney, 82; Owen (D D), 47a  
 Clark Co.: Linney, 85  
 Clinton Co.: Loughridge, 90  
 Cumberland Mountain region: Moore (P N),  
 78a

## Silurian—Continued.

Kentucky: Dix River region: Foerste, 12  
 east-central: Foerste, 06  
 Falls of the Ohio: Hall, 79c  
 Fleming Co.: Linney, 86  
 Garrard Co.: Linney, 83  
 Henry Co.: Linney, 87  
 Irvine field: Shaw (E W), 17  
 Jefferson Co.: Butts, 15  
 Lincoln Co.: Linney, 83a  
 London quadrangle: Campbell (M R), 98a  
 Louisville region: Bassler, 09b; Yandell, 47  
 Marion Co.: Knott, 85  
 Mason Co.: Linney, 86a  
 Montgomery Co.: Linney, 85  
 Nelson Co.: Linney, 84  
 Oldham Co.: Linney, 87  
 Richmond quadrangle: Campbell (M R), 98  
 Shelby Co.: Linney, 87  
 Washington Co.: Linney, 83c  
 Wayne Co.: Munn, 14a  
 western: Owen (D D), 57  
 Lake Superior region: Foster, 51e  
 Leclaire beds: Norton, 95c  
 Leclaire limestone: Calvin, 96a  
 Lower Helderberg formation: Callaway, 78;  
 Hall, 74b  
 Maine: Emmons (W H), 10a; Hitchcock (C H),  
 61, 62a; Matthew (G F), 70; Williams (H  
 S), 00  
 Aroostook Co.: Bailey (L W), 88a; Gregory  
 (H E), 00  
 Cobscook Bay: Shaler, 86  
 Dennis River: Rogers (W B), 61e  
 eastern: Bailey (L W), 90b  
 Eastport quadrangle: Bastin, 13c, 14  
 Fox Islands: Smith (G O), 96, 02a  
 northern: Bailey (L W), 87a; Hitchcock (C  
 H), 61a  
 northwestern: Hitchcock (C H), 74h  
 Penobscot Bay quadrangle: Dodge (W W),  
 92; Smith (G O), 07d  
 Perry district: Smith (G O), 05  
 Manitoba: Kindle, 14a; McInnes, 13a; MacLean,  
 14; Malcolm, 13; Tyrrell, 92b  
 Lake Winnipeg region: Dowling, 00a  
 Lake Winnipeg-Burntwood River region:  
 Dowling 02; Tyrrell 02  
 Saskatchewan River valley: Kindle, 15a  
 Stonewall: MacLean (A), 13  
 western: Tyrrell, 92  
 Winnipeg: Panton, 83a  
 Maryland: Clark (W B), 97b, 06c; Prouty, 08;  
 Swartz, 16  
 Allegany Co.: O'Harra, 00; Prosser, 01b  
 Cumberland: Uhler, 05  
 Niagara: Uhler, 08  
 Pawpaw and Hancock quadrangles: Stose,  
 12b  
 upper Cayuga: Maynard, 10  
 Massachusetts: Emerson (B K), 17  
 Connecticut Valley, Helderberg rocks: Dana  
 (J D), 73h  
 Medina formation: Schuchert, 14a; Ulrich, 13a  
 Mexico, Sonora: Dumble, 00a  
 Michigan: Cook (C W), 14; Lane, 09, 09d;  
 Sherzer, 09; Winchell (A), 61



## Silurian—Continued.

- Michigan: Ann Arbor quadrangle: Russel (I C), 08  
 Detroit district: Sherzer, 17  
 Drummond Island: Locke, 47  
 Grand Traverse region: Winchell (A), 66  
 Lake Superior region: Foster, 51  
 Limestone Mountain, Houghton Co.: Case, 15a  
 Lower Peninsula: Lane, 95  
 Monroe Co.: Sherzer, 00  
 northern: Russell, 05a  
 southern: Sherzer, 09; Monroe formation: Grabau, 10  
 Sylvania sandrock contour: Nattress, 10  
 Upper Peninsula: Hall, 51b; Rominger, 73, Savage, 18  
 Wayne Co.: Sherzer, 13  
 Minnesota, Dodge Co.: Harrington (M W), 84  
 Fillmore Co.: Winchell (N H), 76  
 Mower Co.: Winchell (N H), 75c  
 Mississippi Valley: Hall, 57f; upper: Owen (D D), 52  
 Missouri: Branson, 18a; Broadhead, 93b; Buckley, 04; Gallaher, 00; Swallow, 55a, 58; Winslow, 95  
 Alexandrian series: Savage, 13, 13a  
 Cape Girardeau Co.: Shumard (B F), 63d, 73  
 Girardeau and Edgewood formations: Savage, 10b  
 Louisiana: Keyes, 97f  
 Ozark region: Crane (G W), 12; Keyes, 95g  
 Perry Co.: Shumard (B F), 73  
 Pike Co.: Rowley, 08  
 Ste. Genevieve Co.: Shumard (B F), 59b, 73  
 Montana: Walcott, 08a  
 Castle Mountain district: Weed, 96a  
 Garnet Range: Pardee, 18  
 Garrison-Philipsburg fields: Pardee, 17  
 Judith Mountains: Weed, 98  
 Little Belt Mountains: Weed, 00  
 Philipsburg quadrangle: Calkins, 15; Emmons (W H), 07a, 13b  
 Nevada: Spurr, 03  
 Bullfrog district: Ransome, 10c  
 Eureka district: Hague (A), 83, 92  
 Hot Creek district: Whitney, 67c  
 southwestern: Ball (S H), 07  
 New Brunswick: Bailey (L W), 76, 87a, 90a, b, 01a; Dawson (J W), 55; Eells, 06c, 08a; Gesner, 43; Hind, 65; Matthew (G F), 70, 08  
 Bathurst district: Young, 11a  
 Charlotte Co.: Matthew (G F), 65a  
 northern: Bailey (L W), 87; Eells, 81; and eastern: Eells, 83  
 northwestern: Bailey (L W), 88  
 southern: Bailey (L W), 65, 72, 77, 80; Eells, 12; Matthew (G F), 65c, 79  
 volcanic rocks: Bailey (L W), 05a  
 western: Bailey (L W), 86  
 York and Carleton cos.: Bailey (L W), 85a  
 York Co.: Matthew (G F), 02  
 New England: Brown (T C), 06; Dale, 86  
 Newfoundland: Milne, 77; Murray, 66, 81  
 New Hampshire, Ammonoosuc district: Hitchcock (C H), 04a  
 Helderberg: Hitchcock (C H), 74d

## Silurian—Continued.

- New Jersey: Cook, 68; Kimmel, 09; Lewis (J V), 15; Schuchert, 16a; Weller, 03  
 Franklin Furnace quadrangle: Kimmel, 08a  
 Green Pond Mountain region: Darton, 94f; Kimmel, 02a  
 Montague: Barrett (S T), 78a  
 Passaic quadrangle: Darton, 08b  
 Raritan quadrangle: Bayley, 14  
 Sussex Co., Walpack Ridge: Weller, 00  
 New Mexico: Gordon (C H), 06  
 Deming quadrangle: Darton, 17  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Silver City quadrangle: Paige, 16  
 southern: Darton, 17a  
 New York: Bigsby, 58; Brown (T C), 06; Chadwick, 18a; Clarke (J M), 03g; Conrad, 40a; Hartnagel, 12; Lane, 09d; Newland, 08a  
 Albany Co.: Darton, 94a  
 Attica-Depew quadrangles: Luther, 14  
 Auburn-Genoa quadrangles: Luther, 10  
 Becraft Mountain, Columbia Co.: Davis (W M), 83c; Grabau, 03  
 Brockport and Medina quadrangles: Clarke (J M), 02d  
 Buffalo district: Ashburner, 89a; Luther, 06  
 Canandaigua and Naples quadrangles: Clarke (J M), 04b  
 Cayuga Co.: Hartnagel, 03  
 central: Prosser, 93a; Taber (S), 18  
 east central: Harris, 04b  
 eastern: Darton, 94; Hartnagel, 05  
 Erie Co.: Grabau, 00b; Houghton (F), 14  
 Frankfort region: White (T G), 99  
 Helderberg, Lower: Williams (S G), 86a  
 Helderberg Plateau, northern end: Prosser, 00  
 Helderbergs, eastern: Prosser, 99a  
 Indian Ladder section: Prosser (C S), 07  
 Livonia salt shaft: Luther, 94  
 Lockport: Henwood, 42  
 Madison Co.: Lincklaen, 45; Prosser, 88a  
 Medina sandstone: Kindle, 14f  
 Mount Bob: Harris (T W), 92  
 Niagara Co.: Alexine, 81  
 Niagara Falls and gorge: Taylor (F B), 13a  
 Niagara region: Grabau, 01; Kindle, 13c, 14e  
 Niagara shales: Ringueberg, 88  
 Oneida conglomerate: Grabau, 05; Hartnagel, 07  
 Oneida Co.: Brigham, 89  
 Onondaga Co.: Luther, 97a; Schneider, 94  
 Orange Co.: Darton, 86; Ries, 97b; Cornwall: Dwight, 84a; Trilobite Mountain: Shimer, 05  
 Port Jervis: Barrett, 76a  
 Port Leyden quadrangle: Miller (W J), 10  
 Rochester: Fairchild, 94c; Guelph formation: Arey, 93  
 Rochester and Ontario Beach quadrangles: Hartnagel, 07b  
 Rondout: Davis (W M), 83d; Lindsley, 79; Van Ingen, 03  
 Salina formation: Newland, 10  
 Salina group: Newberry, 89c



## Silurian—Continued.

New York: Schoharie Valley: Grabau, 06; Stevenson, 01  
 Seneca Co.: Lincoln, 97  
 Shawangunk conglomerate: Grabau, 06a  
 Shawangunk Mountains: Clarke (J M), 07c  
 Skunnemunk Mountain: Darton, 94f; Hartnagel, 07a  
 southeastern: Berkey, 11; Mather, 43; Schuchert, 16a  
 Syracuse quadrangle: Hopkins (T C), 14  
 Third district: Vanuxem, 42  
 Tully quadrangle: Clarke (J M), 05c  
 Ulster Co.: Brown (T C), 14a; Darton, 94b  
 western: Hall, 43; Prosser 92d; Clinton and Niagara: Sarle, 01  
 western central: Prosser, 90  
 New York series: Clarke (J M), 99i; revision: Chadwick, 08  
 Niagara formation: Hall, 74b  
 Nomenclature and subdivision of upper Silurian strata of Michigan, Ohio, and western New York: Lane, 09d  
 North America: Willis, 12  
 North Dakota: Leonard, 04a  
 Northwest Territory: Keele, 10; Meek, 67  
 Great Slave Lake region: Cameron, 18  
 Hudson Bay Region: Tyrrell, 97  
 Winisk and upper Attawapiskat rivers regions: McInnes, 09a  
 Nova Scotia: Dawson (J W), 55, 60b; Hall, 60i; Honeyman, 74  
 Annapolis Co.: Honeyman, 80  
 Antigonish Co.: Ami, 01b, m; Honeyman, 66, 76a, 86b  
 Arisaig area: Twenhöfel, 13  
 Arisaig section: Twenhöfel, 09  
 Arisaig series: Honeyman, 70b  
 Arisaig-Antigonish district: Williams (M Y), 11, 12, 14  
 Cape Breton Island: Fletcher, 79  
 eastern: Fletcher, 87; Honeyman, 60  
 Kings and Hants cos.: Fletcher, 02  
 Nictaux: Honeyman, 78  
 Pictou and Colchester cos.: Fletcher, 92  
 Pictou coal field: Honeyman, 72b; Poole, 93, 04  
 Pictou Co.: Honeyman, 72c, 80b  
 Pictou region: Dawson (J W), 80d  
 southwestern: Bailey (L W), 98  
 Ohio: Bownocker, 11a, 15; Foerste, 17a; Hall, 43c; Lane, 09d; Newberry, 71, 73, 78; Orton, 88, 93a; Prosser, 05; Rogers (W B), 42a  
 Adams Co.: Orton, 71a  
 Allen Co.: Winchell (N H), 74  
 Auglaize Co.: Winchell (N H), 74  
 Champaign Co.: Hill (F C), 78  
 Clinton Co.: Hussey, 78  
 Clinton formation: Foerste, 96  
 Columbus quadrangle: Hubbard (G D), 15; Stauffer, 11a  
 Darke Co.: Lindenmuth, 78  
 Dayton region: Van Cleve, 49  
 Erie Co.: Newberry, 74b  
 Fayette Co.: Hussey, 78  
 Findlay borings: Condit, 13

## Silurian—Continued.

Ohio: Greene Co.: Orton, 74  
 Hancock Co.: Winchell (N H), 74  
 Hardin Co.: Winchell (N H), 74  
 Henry Co.: Winchell (N H), 74  
 Highland Co.: Orton, 71a  
 Logan Co.: Hill (F C), 78  
 Marion Co.: Winchell (N H), 73  
 Mercer Co.: Winchell (N H), 74  
 Miami Co.: Hussey, 78  
 Montgomery Co.: Orton, 71  
 Ottawa Co.: Winchell (N H), 74  
 Paulding Co.: Winchell (N H), 74  
 Pike Co.: Orton, 74  
 Preble Co.: Orton, 78  
 Putnam Co.: Winchell (N H), 74  
 Sandusky Co.: Winchell (N H), 73  
 Seneca Co.: Winchell (N H), 73  
 Shelby Co.: Hussey, 78  
 southwestern: Fuller, 12b; Locke, 38; Orton, 73  
 Todd's Fork: Foerste, 88a  
 Union Co.: Winchell (N H), 74  
 Van Wert Co.: Winchell (N H), 74  
 Warren Co.: Orton, 78  
 western, Niagaran: Prosser, 16  
 Wood Co.: Winchell (N H), 74  
 Wooster area: Bonine, 15  
 Wyandot Co.: Winchell (N H), 73  
 Ohio basin: Claypole, 03  
 Oklahoma: Drake, 97; Wallis, 15  
 Arbuckle Mountains: Reeds, 10; Taff, 04  
 Hunton formation: Reeds, 11  
 Atoka quadrangle: Taff, 02  
 Muscogee quadrangle: Taff, 06  
 northeastern: Snider, 15  
 Ouachita Mountains: Hill (R T), 91a  
 southern: Hutchison, 11  
 Tahlequah quadrangle: Taff, 05  
 Tishomingo quadrangle: Taff, 03  
 Ontario: Bell (R), 89b; Chapman (E J), 75; Knight (C W), 15a; Logan, 54b; Malcolm, 15; Murray, 45, 54a; Parks, 13b; Rogers (W B), 42a  
 Cobalt area: Miller (W G), 13a  
 Collingwood: Parks, 13d  
 Credit River area: Parks, 13d  
 Detroit River area: Nattress, 12  
 Eramosa beds: Williams (M Y), 15a  
 French River sheet: Bell (R), 98  
 Guelph formation: Williams (M Y), 16a  
 Hamilton area: Grant (C C), 99, 00a, 01, 02b; Parks, 13c; Spencer (J W), 75  
 James Bay region: Dowling, 04  
 Lake Huron Islands: Ami, 99a  
 Lake Huron region: Murray, 49  
 Lake Ontario, western end: Spencer (J W), 82  
 Lake Timiskaming: Hume, 17; Williams (M Y), 15  
 Manitoulin Island: Bell (R), 66, 70; Williams (M Y), 13a, 14a  
 Niagara Falls and gorge: Taylor (F B), 13a  
 Niagara region: Grant (C C), 92a; Robb, 60  
 Ottawa region: Ami, 96a  
 Patricia district: Tyrrell, 13  
 region between Lakes Huron and Erie: Murray, 52



## Silurian—Continued.

- Ontario: southwestern: Brumell, 93a; Hunt, 68b; Parks, 03a; Stauffer, 14; Williams (M Y), 13b, 14c, d, 15b, 16, 17  
 Sylvania sandrock contour: Nattress, 10  
 Ontario section: Hartnagel, 06  
 Ordovician-Silurian boundary: Shideler, 16; Ulrich, 13  
 Ostracoda as guide fossils in Appalachian region: Ulrich, 17a  
 Ozark region: Adams (G I), 01  
 Paleogeographic map: Willis, 09  
 Pennsylvania: Claypole, 84m; Lesley, 92; Rogers (H D), 58; Schuchert, 16a  
 Bedford Co.: Stevenson, 85  
 Blair and Huntingdon cos. section: Butts, 18  
 Blair Co.: Platt (F), 81a  
 Centre Co.: D'Invilliers, 84; Ewing, 84  
 Clinton Co.: Chance, 78, 80  
 Fulton Co.: Stevenson, 85  
 Huntingdon Co.: Ashburner, 77, 78; White (I C), 85  
 Juniata district: Dewees, 78; D'Invilliers, 91  
 Lehigh Co.: Miller (B L), 14  
 Lehigh district: Peck, 11  
 Lehigh Gap: Miller (B L), 11b  
 Lehigh River section: Hill (F A), 87b  
 Lycoming Co.: Sherwood, 80  
 Milesburg Gap, Bellefonte: Brown (T C), 13  
 Mercersburg-Chambersburg district: Stose, 09  
 Monroe Co.: White (I C), 82  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Perry Co.: Claypole, 84e, 85  
 Pike Co.: White (I C), 82  
 Shawangunk: Grabau, 09e  
 shore and offshore deposits: Van Ingen, 11  
 Susquehanna River region: White (I C), 83  
 Quebec, Anticosti: Chapman (E J), 57; Richardson (J), 57; Schmitt, 04; Twenhofel, 14  
 eastern townships: Ells, 87a  
 Entry Island (Magdalen Islands): Clarke (J M), 12a  
 Gaspé district: Mailhiot, 11  
 Gaspé Peninsula: Clarke (J M), 13d; Ells, 83a, 85; Low, 85; Richardson (J), 58, 59  
 Lake Timiskaming area: Wilson (M E), 10a  
 Montreal district: Ami, 04a; Ells, 96  
 Nipissing-Timiskaming area: Barlow, 99  
 Orford area: Harvie, 12  
 St. Helen's Island: Deeks, 90  
 St. Lawrence, region south of: Richardson (J), 70  
 southern: Dresser, 10b; Harvie, 14  
 Temiscouata and Rimouski cos.: Bailey (L W), 93  
 Three Rivers sheet: Ells, 00  
 Timiskaming Co.: Wilson (M E), 18  
 Richmond formations: Foerste, 13a  
 Rocky Mountain region: Tomlinson, 17  
 Salina group Ohio: Newberry, 73f  
 Salt deposits origin: Grabau, 13a  
 Saskatchewan: McInnes, 13a  
 Siluric system, revised classification: Grabau, 08c  
 South Dakota, Black Hills: Beecher, 96d  
 Subdivision: Grabau, 12e

## Silurian—Continued.

- Tennessee: Foerste, 01; Roemer, 60a; Safford, 56, 69  
 Briceville quadrangle: Keith, 96b  
 Chattanooga quadrangle: Hayes, 94b  
 Cleveland quadrangle: Hayes, 95a  
 Columbia quadrangle: Hayes, 03  
 Coosa Valley: McCalley, 97  
 eastern: Burchard, 13a  
 Greenville quadrangle: Keith, 05  
 Harpeth Ridge: Loomis, 46  
 Kingston quadrangle: Hayes, 94a  
 Loudon quadrangle: Keith, 96  
 Maynardville quadrangle: Keith, 01  
 middle: Safford, 51  
 Morristown quadrangle: Keith, 96a  
 Perry Co.: Wade (B), 14  
 Pikeville quadrangle: Hayes, 95b  
 Sewanee quadrangle: Hayes, 94c  
 southeastern: Ulrich, 13e  
 Waynesboro quadrangle: Drake, 14; Miser, 17a  
 western: Foerste, 03b; Pate, 08; Roemer, 60; Safford, 61  
 Texas: Udden, 16a  
 Black and Grand prairies: Hill (R T), 01  
 El Paso quadrangle: Richardson (G B), 09  
 trans-Pecos: Richardson (G B), 04  
 United States: Conrad, 42a  
 Upper Mississippi Valley: Locke, 40  
 Utah: Kindle, 08  
 Randolph quadrangle: Richardson (G B), 13  
 San Francisco district: Butler (B S), 13  
 Uinta Mountains: Berkey, 05a  
 Wasatch Mountains: Blackwelder, 10a; Hintze, 13  
 Vermont, Taconic Range: Dale, 04c  
 Virginia, Abingdon quadrangle: Stose, 14  
 Appalachian region: Campbell (J L), 79a; Darton, 92c  
 Bristol quadrangle: Campbell (M R), 99a  
 Buchanan Co.: Hinds, 18  
 central: Campbell (J L), 79  
 Estillville quadrangle: Campbell (M R), 94  
 James River valley: Campbell (J L), 82  
 Massanutten Mountain: Spencer (A C), 97  
 Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Monterey quadrangle: Darton, 99  
 southwestern: Stevenson, 81c, d, 85a, 87  
 Staunton quadrangle: Darton, 94e  
 Tazewell quadrangle: Campbell (M R), 97  
 Western America: Kindle, 08  
 Western States, fortieth parallel: King (C), 76a  
 West Virginia: Grimsley, 06  
 Franklin quadrangle: Darton, 96c  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Monterey quadrangle: Darton, 99  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Piedmont quadrangle: Darton, 96b  
 Potomac River region: White (I C), 81c  
 Wisconsin: Buckley, 98; Chamberlin (T C), 83; Daniels, 58c; Hall, 62j; Weidman, 15  
 Blue Mound: Hubbard (G D), 00  
 eastern: Chamberlin (T C), 77a



**Silurian—Continued.**

- Wisconsin: Milwaukee quadrangle: Alden, 06  
 southeastern: Alden, 18; Lapham, 51a  
 southwestern: Grant (U S), 03  
 Wyoming, Big Horn dolomite: Blackwelder, 13b  
 Big Horn Mountains: Beecher, 96d  
 northwestern: Eldridge, 94a  
 western: Schultz, 18  
 Yukon, international boundary: Cairnes, 14  
 Siluro-Devonian boundary: Clarke (J M), 00e  
**Silver.** *See also names of silver-producing States, etc.*  
 Argentiferous galena ores: Nissen, 15  
 Bonanza ores of arid region, origin: Keyes, 11  
 Bornite as silver precipitant: Palmer (C), 15  
 Classification of deposits: Lindsley, 14  
 Colloidal silver: Bastin, 15  
 Eastern States: Dunlop, 15  
 Enrichment: Bastin, 13a; Cooke (H C), 13;  
 Emmons (W H), 17; Palmer (C), 14a;  
 Weed, 01c  
 Enrichment experiments: Ravicz, 15  
 General: Blake (W P), 69; Coghill, 12; Crane,  
 08; Emmons (S F), 93b; Lindgren, 16;  
 Matteson, 11; Newberry, 79d  
 Genesis of silver deposits: Matteson, 12b  
 Geographic distribution, United States and  
 Canada: Marcou, 67c  
 Geologic structure of silver districts: Matteson,  
 12  
 Halogen salts, occurrence: Lindgren, 18  
 Lake Superior region: Dubois, 71  
 metallic precipitants: Palmer (C), 13a  
 Microscopic study of silver ores: Guild, 17  
 Microscopical determination: Curtis, 85  
 Minerals of silver deposits: Matteson, 12a  
 North America: Lindgren, 16  
 Occurrence in galena and iron pyrites: Dewar,  
 91  
 Occurrence in Rocky Mountains and Califor-  
 nia: Marcou, 61b  
 Ores, classification: Fulton (C H), 16  
 Ores in minerals: Blake (W P), 61a  
 Ores in sandstone and shale: Lindgren, 11a  
 Production: Lindgren, 05c, 08b; Newberry, 88c  
 Prospecting: Lakes, 95  
 Selenium with pyrite: Pearce, 98g  
 United States: Lindgren, 09b; U S G S, 83  
 Silverbell mining district, Ariz.: Stewart (C A), 12;  
 Tolman, 09e  
 Silver City, N. Mex.: Brinsmade, 08e  
 Silver City folio, Idaho (no. 104): Lindgren, 04a  
 Silver City folio, N. Mex. (no. 199): Paige, 16  
 Silveria formation: Hershey, 96c  
 Silver Islet mine, Lake Superior: Lowe, 82; McDer-  
 mott, 77; Macfarlane, 80a  
 Silver Lake basin, Colo.: Prosser (W C), 14  
 Silver Peak quadrangle, Nev.: Spurr, 06b; Turner,  
 09  
 Silver Peak quartz veins: Hastings, 06  
 Silverton folio, Colo. (no. 120): Cross, 05  
 Simcoe district, Ont.: Johnston (W A), 09, 10, 11  
 Similkameen district, B. C.: Camsell, 06a, 07, 09, 11  
 Simpson, G. B., biography: Clarke (J M), 02c  
 Singing beach, Manchester, Mass.: Bolton, 83, 83a  
 Singing sand: Bolton, 84

**Sink holes.**

- Florida: Matson, 09b; Sellards, 06, 08a, 10a  
 Illinois, St. Louis quadrangle: Fenneman, 11  
 Indiana: Elrod, 99; southern: Cumings, 12a  
 Kansas, Meade Co.: Mudge, 79; Wabaunsee  
 Co.: Savage, 81  
 Missouri, Newburg district: Lee (W), 11;  
 Rolla quadrangle: Lee (W), 14  
 Origin: Purdue, 07c; Sellards, 07c  
 Virginia, Staunton: Kindle, 11a; Van Horn  
 (F B), 10  
 Sinopa, osteology: Matthew (W D), 05c, 06  
 Sinter, siliceous: Weed, 91b  
 Sioux quartzite, Iowa: Beyer, 97; Keyes, 93h, 95r  
 Siphon springs: Cleland, 11b  
 Sitka district, Alaska: Knopf, 12a  
 Skagit Valley, Yale district, B. C.: Camsell, 12b  
 Skeena River district, B. C.: Leach, 10, 10a, 11  
 Skiagraphy of fossils: Field, 15a  
 Skolai Mountains, Alaska: Rohn, 00  
 Skunnemunk Mountain region, N. Y.: Hartnagel,  
 07a  
 Slags, natural, Wyoming: Bastin, 05  
 Slate. *See also names of slate-producing States.*  
 Composition: Eckel, 04g  
 General: Dale, 05, 13; Loughlin, 16; Williams  
 (H J), 96  
 Origin: Purdue, 09  
 Southern States: Grasty, 14a  
 United States (general): Dale, 06a, 13, 14;  
 U S G S, 83  
 Slaty cleavage: Becker, 04  
 Slickensides: Lawson, 09; Luzerne Co. Pa.: Lyman,  
 66  
 Slide rule in rock analyses: Hance, 15  
 Slides. *See Landslides.*  
 Slocan district, B. C.: LeRoy, 09, 10, 11  
 Smartsville folio, Calif. (no. 18): Lindgren, 95a  
 Smith, J. L., biography: Silliman (jr), 86  
 Smoking bluffs, Missouri River region: Powers, 04  
 Snake Creek fauna: Matthew (W D), 18  
 Snoqualmie folio, Wash. (no. 139): Smith (G O),  
 06b  
 Soapstone.  
 General: Diller, 09b; Pratt, 01g  
 Societies. *See Associations.*  
 Socorro: Grayson, 72  
 Soda.  
 California: Ochsenius, 02  
 Colorado, San Luis Valley, alkali lakes: Fleck,  
 05  
 General: Packard (R L), 94c  
 Great Basin: Knapp (S A), 98, 99  
 Mexico, Lake Texcoco: Flores, 18  
 lakes: Virlet d'Aoust, 65  
 United States: Chatard, 95  
 Wyoming: Knight (W C), 98a; Schultz, 10b;  
 Laramie and Sherman quadrangles: Dar-  
 ton, 10c  
 Soil flow: Hobbs, 13a  
 Soil stripes in cold humid regions: Hobbs, 10  
 Soils. *See also names of States, etc.*  
 Animal agency in soil making: Shaler, 88d  
 Basalts, northwestern, soil formation from  
 Hilgard, 87  
 Color: Crosby, 86a, 91  
 Cotton States: Hilgard, 84a



## Soils--Continued.

- Erosion: McGee, 11  
 Formation: Brigham (A P), 10; Gaylord, 43; Hilgard, 06a; Kedzie (W K), 77; Muir, 74c; Thompson (M), 89c; from basalt: Hilgard, 87  
 General: Barbour, 95b; Emmons (E), 45; Hilgard, 06; Holbrook (J), 51; King (F H), 11; Merrill (G P), 97; Von Engeln, 11a  
 Geology: Winchell (A), 65c; of Iowa soils: McGee, 81e  
 Mississippi Bottom, origin: Hilgard, 71b  
 Origin: Barbour, 95b; Spencer (J W), 85b, 89a; Stockbridge, 88; and nature: Shaler, 91  
 Ozark region: Hershey, 96e  
 Relation to geology: Marbut, 16  
 Soil fertility and permanent agriculture: Hopkins (C G), 10  
 Soil productivity: Chamberlin (T C), 11  
 Soil solution, composition of: Cameron, 10  
 Soil wastage: Chamberlin (T C), 09  
 Source of constituents: Hall (C W), 01c  
 Texture and structure: Whitney (M), 96  
 Treatise on rocks, rock weathering, and soils: Merrill (G P), 06  
 United States: Marbut, 13a; Whitney (M), 02  
 Solar hypothesis of climatic changes: Huntington, 14a  
 Soleniscus: Keyes, 89a  
 Solenopsidae: Cockerell, 15f  
 Solfataras, Santa Barbara, Cal.: Ford (H C), 90a  
 Solidification of alloys and magmas: Aston, 09  
 Solifluxion: Andersson, 06; Hobbs, 13a; northern Greenland: Ekblaw, 18  
 Solomon quadrangle, Alaska: Smith (P S), 10  
 Solomon River basin, Alaska: Smith (P S), 07  
 Sombrero: Julien, 66; Spencer (J W), 01b  
 Sonora folio, Cal. (no. 41): Turner, 97a  
 South Carolina.

- Charleston: Holmes (F S), 49  
 General: Dickson, 21; Hodge (J T), 41; Mills (R), 26  
 Geological surveys: Holmes (J A), 91  
 Guano, fossil, Charleston: Jackson, 68  
 Infusorial deposits, Charleston: Bailey (J W), 45b  
 Mineralogical and geological cabinets of South Carolina College: Martin (D S), 06  
 Soil geology: Hammond (H), 84  
 State geologist, report 1911: Twitchell, 12

*Economic geology.*

- Barite: Watson (T L), 15; Kings Creek: Watkins, 15a  
 Building stone: Sloan, 07  
 Cement materials: Eckel, 13  
 Clay: Sloan, 04, 07, 08  
 Cobalt: Sloan, 08  
 Copper: Lieber, 55; Sloan, 07, 08  
 General: Lieber, 56, 59, 59d, 60; Tuomey, 44, 48; Vanuxem, 26  
 Gold: Dickson, 34; Eaton (A), 30b; Graton, 06a; Hanna, 82; Leeds, 54; Lieber, 55, 56, 58, 59, 59a, 60; Pratt, 02h; Schmidhuber, 43; Sloan, 07, 08; Spilsbury, 84; Tuomey, 44; Weed, 01e

## South Carolina--Continued.

*Economic geology--Continued.*

- Gold, central slate belt, genesis: Nitze, 97d  
 Spartanburg: Ladshaw, 92  
 Walhalla district: Peterson, 16  
 Granite: Sloan, 08; Watson (T L), 09b, 10, 10a  
 Graphite: Sloan, 07, 08  
 Iron: Sloan, 07, 08  
 Itacolumite: Lieber, 59a  
 Kaolin, Aiken district: Sproat, 16  
 Lancaster Co., Haile mine: Credner, 70a; Thies, 91  
 Lead: Sloan, 08  
 Limestone: Calhoun, 15; Sloan, 07, 08  
 Manganese: Harder, 10  
 Marble: Sloan, 07, 08  
 Marl: Calhoun, 15; Ruffin, 43; Lynch Creek: Ruffin, 44  
 Mica: Sloan, 07, 08  
 Mineral resources: Sloan, 05, 07, 07a, 08  
 Monazite: Böhm, 06; Mezger, 96; Nitze, 97a; Pratt, 08, 09a; Sterrett, 07a, 08a  
 Peat: Sloan, 08  
 Phosphate: Brown (L P), 05; Chazal, 04; Holmes (F S), 70; Matthew (G F), 09; Millar, 92; Moses, 83; Paekard (A S), 71; Pratt (N A), 68; Reese, 92; Rogers (G S), 14a; Shaler, 70a, 73; Shepard, 69b; Sloan, 07, 08; Van Horn (F B), 09; Waggaman, 13; origin: Kerr, 70a  
 Phosphatic sand: Shepard, 71  
 Pisgah quadrangle: Keith, 07a  
 Pyrite, Kershaw: Watkins, 18  
 Sand: Sloan, 08  
 Slate: Sloan, 08  
 Soapstone: Mell, 82; Sloan, 08  
 Steatite: Sloan, 08  
 Stone: Sloan, 08  
 Sulphur, York Co.: Cobb, 94a  
 Tale: Sloan, 08  
 Tin deposits: Ball (S M), 09a; Graton, 05, 06a; Hess, 06c, 09; Pratt, 04; Sloan, 07, 08  
 Gaffney: Keith, 17  
 Kings Mountain district: Keith, 17  
 Union and Spartanburg districts: Lieber, 58  
 Walhalla district: Peterson, 16

*Historical geology.*

- Appalachians, southern: Elliott (J B), 83  
 Appomattox formation: McGee, 90  
 Ashley River: Holmes (F S), 50a  
 Boring, Charleston: Barbot, 85; Lynch (C N), 53; Lyneh (P R), 53; Stephenson, 14a  
 Charleston: Holmes (F S), 49; Cretaceous and Tertiary: Vogdes, 78a  
 Coastal Plain: Ruffin, 43  
 Coastal Plain series: Darton, 96f  
 Eocene: Lyell, 45b  
 General: Darton, 96d; Hammond (H), 83; Lieber, 56, 59, 59d, 60; Sloan, 04, 07, 08; Tuomey, 44, 48  
 Kings Mountain district: Keith, 17  
 Lancaster Co., Haile mine: Thies, 91  
 Marl, Lyneh Creek: Ruffin, 44  
 Mesozoic: Jones (T R), 63  
 Miocene: Lyell, 45a  
 Phosphate beds: Newberry, 71i; Shaler, 70a  
 Phosphatic rock, Ashley district: Dall, 94a



## South Carolina—Continued.

*Historical geology*—Continued.

- Pisgah quadrangle: Keith, 07a  
 Pleistocene: Pugh, 05  
 Post-Pliocene: Holmes (F S), 59, 60  
 Red hills and sand hills: Ward (L F), 95b  
 Sand-hill country: Holmes (J A), 93b  
 Tertiary: Conrad, 67; Heilprin, 84a, Smith (J L), 44; Tuomey, 49  
     correlation: Vaughan, 18d  
     post-Eocene: Heilprin, 82b  
 Union and Spartanburg districts: Lieber, 58

*Mineralogy*.

- General: Vanuxem, 26  
 Meteorite, Bishopville: Smith (J L), 64; Wadsworth, 83  
     Chester Co.: Cohen, 92  
     Chesterville: Cohen, 92  
     Laurens Co.: Hidden, 86, 86g  
     Lexington Co.: Shepard, 81  
     Newberry: Shepard, 50  
     Richland: Shepard, 50  
 Polycrase: Hidden, 90, 91  
 Pyroxene in granite, Columbia: Vanuxem, 21  
 Pyroxmangite and skemmatite, Anderson Co.: Ford (W E), 13, 13a  
 Quartz, flexible, Spartanburg: Lea, 46

*Paleontology*.

- Anomia, Charleston: Mazyck, 78  
 Arcas: Sheldon, 17  
 Ashley phosphate beds, fossils: Leidy, 76a  
 Balanus, Eocene, Ashley River: Holmes (F S), 56  
 Basilosaurus: Gibbes, 47; Tuomey, 47  
 Capybara: Leidy, 90b  
 Cetacea: Leidy, 68; Ashley River: Leidy, 53e  
 Cetacean, Dorudon serratus: True, 08b  
 Charleston, boring: Stephenson, 14a  
 Columbella, post-Pliocene: Ravenel, 59  
 Conosaurus: Leidy, 68g  
 Cretaceous floras: Berry, 07e, 14; Lycopodium: Berry, 10i  
 Cyclotomodon, Charleston: Cope, 76e  
 Dioplotherium: Cope, 83g  
 Dorudon: Agassiz (L), 48; Gibbes, 45, 48a  
 Echinids, Tertiary: Stefanini, 12  
 Echinodermata: Ravenel, 50  
 Echinoidea: Conrad, 65b  
 Eocene: Conrad, 47; Lyell, 45b; Ravenel, 44  
 Foraminifera, Coastal Plain: Cushman, 18  
 General: Tuomey, 48  
 Mammalia, occurrence: Holmes (F S), 50  
 Mastodon: Leidy, 90b; Loomis, 18  
 Mesozoic flora: Berry, 11j  
 Mollusca, Tertiary: Conrad, 44, 68a  
 Myliobates: Gibbes, 50  
 Neocene Mollusca: Olsson, 14  
 Palaeochenoides mioceanus: Shufeldt, 16  
 Phosphate beds: Newberry, 71i  
 Phoca: Leidy, 56m  
 Pisces: Leidy, 55a  
 Pliocene fossils: Tuomey, 57  
 Post-Pliocene: Holmes (F S), 58, 59, 60; Vertebrata: Leidy, 60  
 Saurocetus: Agassiz (L), 48  
 Scutella: Ravenel, 41, 42  
 Squalidae: Gibbes, 47a; Columbia: Gibbes, 46

## South Carolina—Continued.

*Paleontology*—Continued.

- Squalodon, Charleston: Allen (J A), 87  
 Tertiary fossils: Conrad, 41a  
 Vertebrata, phosphate beds: Leidy, 77  
 Waccamaw fauna: Gardner (J A), 15  
 Zeuglodon, Charleston: Tuomey, 47

*Petrology*.

- General: Lieber, 59  
 Granites: Watson (T L), 09b, 10a  
 Itacolumite: Lieber, 59a; Shepard, 45a  
 Spartanburg Co.: Richards (G F), 88

*Physical geology*.

- Changes along coast: Lieber, 59b  
 Charleston, seismic activity: Taber (S), 14  
     earthquake shocks: Claypole, 88e  
 Charleston earthquake, August 31, 1886: Cope, 86q; Davison (C), 05; Dutton, 87a, b, 89; Fuller, 06j; Harboe, 07; Hayden (Everett), 86, 86a; Hobbs, 07h, 08; Hovey, 09a; Kemp, 02c; McGee, 86a; Meigs, 86; Mendenhall (T C), 86, 87; Newcomb, 88; Rockwell, 87; Topley, 87; limits: O'Reilly, 86  
 Earthquake, 1857: Gibbes, 59  
     1914: Taber (S), 15  
     January 1, 1913: Taber (S), 13a

*Physiographic geology*.

- Cuspate capes: Abbe, 95  
 Darlington: Glenn, 95  
 General: Glenn, 98; Hammond (H), 83, 84  
 Isle of Palms: Randolph, 16  
 Sand-hill topography: Cobb, 03  
 Tallulah district, drainage modifications: Johnson (D W), 07, 07c

*Underground water*.

- Charleston: Charleston (City), 82  
 Charleston wells: Palmer (C), 14  
 General: Darton, 96d; Glenn, 05  
 Piedmont Plateau region: Holmes (J A), 96a

## South Dakota.

- Aberdeen quadrangle: Todd, 09  
 Badlands: Culbertson, 51; Fraas, 06  
 Belle Fourche quadrangle: Darton, 09e  
 Black Hills: Darton, 01a, 04, 04a, 05a, 09; Hayden, 61; Jenney, 75; Newton, 80; O'Harra, 00a; Storms, 10  
     bibliography: O'Harra, 00b, 17  
     Cretaceous rim: Ward (L F), 94  
     southern: O'Harra, 99  
     volcanic deposits: Darton, 12c  
 Byron quadrangle: Todd, 09  
 Elk Point quadrangle: Todd, 08  
 General: Emmons (S F), 85; Froebel, 70; Harris (E), 45; Todd, 04e; Warren, 58  
 Mellette, Washabaugh, Bennett, and Todd cos.: Perisho, 12  
 Northville quadrangle: Todd, 09  
 northwest-central S. Dak.: Todd, 10  
 Redfield quadrangle: Todd, 09  
 Rosebud Reservation, including Gregory and Tripp cos.: Perisho, 10  
 Soils, Belle Fourche quadrangle: Darton, 09e  
 State survey: Perisho, 06, 10a, 14; reports: Todd, 98; Ward (F), 18; work of: Ward (F), 16  
 Volcanic dust: Wadsworth, 85c



## South Dakota—Continued.

*Economic geology.*

- Alexandria quadrangle: Todd, 03c  
 Belle Fourche quadrangle: Darton, 09e  
 Black Hills Carpenter (F R), 88, 89; Chance, 91; Darton, 01a; Hayden, 67d; Jenney, 76; Newton, 80; Nicholas, 11a; O'Harra, 01, 02, 04; Scott (S), 97; Storms, 99b, 06b, 10  
 Bald Mountain district: Blatchford, 03, 04  
 Bear Butte: Barrell (R W), 00  
 mother lode: Simmons, 09a  
 northern: Frazer, 98a; Irving, 99, 03, 04; O'Harra (B M), 16  
 southern: O'Harra, 99  
 South Extension Homestake mineral formations: Nicholas, 08b  
 cement materials: Eckel, 13; Black Hills: O'Harra, 08  
 Clay: Todd, 98c; derived from volcanic dust, Pierre formation: Wherry, 17e  
 De Smet quadrangle: Todd, 04a  
 Edgemont quadrangle: Darton, 04a  
 Fuller's earth: Ries, 98a  
 General: Todd, 95, 98  
 Gold: Fulton (C H), 02  
 Black Hills: Carpenter (F R), 88; Chance, 00b, 01; Devereux, 82; Emmons (S F), 96b; Nicholas, 08b; O'Harra, 99; Pratt, 06a; Sadtler, 06; Smith (F C), 98, 00; Storms, 10  
 Graphite, Black Hills: Ferguson (H G), 08  
 Gypsum, Belle Fourche quadrangle: Darton, 09e; Black Hills region: Darton, 09  
 Harding Co., oil and gas possibilities: Ward (F), 18a  
 Harney Peak region: Ziegler, 14b  
 Homestake lode, age: Hewett, 03a  
 Homestake ore body: Paige, 13  
 Huron quadrangle: Todd, 04  
 Iron deposits of the Black Hills: Cooledge, 09  
 Lead district, Homestake mine: Sharwood, 11a  
 Lignite, Cheyenne River Indian Reservation: Calvert, 14  
 Great Sioux Reservation: Willis, 85  
 northwestern S. Dak.: Winchester, 16  
 Standing Rock Indian Reservation: Calvert, 14  
 Lithia deposits, Black Hills: Anderson (A A), 12; Hess, 10d; Ziegler, 13a  
 Mica: Sterrett, 09; Black Hills: Simmons, 10  
 Mineral resources: Todd, 02  
 Mitchell quadrangle: Todd, 03b  
 Olivet quadrangle: Todd, 03  
 Parker quadrangle: Todd, 03a  
 Pennington Co., Golden West mine: Storms, 05a  
 Stone: Todd, 98c; Sioux Falls: Todd, 03f  
 Tin, Black Hills: Alder, 12; Blake (Wm P), 83c, 85c, e; Bland, 17; Carpenter (F R), 88, 06; Claypole, 92b; Headden, 91, 91b; Morse (A J), 94; Sadtler, 06; Simmons, 09; Ulke, 92  
 Tin, tungsten, and tantalum deposits: Hess, 09  
 Tungsten: Bland, 17; Hess, 09; Runner, 16, 18; Black Hills: Simmons, 04  
 Volcanic dust: Todd, 97  
 Wolframite, Black Hills: Irving, 02

## South Dakota—Continued.

*Historical geology.*

- Aberdeen-Redfield district: Todd, 09  
 Alexandria quadrangle: Todd, 03c  
 Badlands region: Darton, 98e  
 Belle Fourche quadrangle: Darton, 09e  
 Benton formation, eastern S. Dak.: Todd, 04c  
 Black Hills: Calvin, 94; Carpenter (F R), 88; Claypole, 92b; Crosby, 88a; Culver, 93; Darton, 96i, 01a, b, 04c, 05, 09, 09d, 18; Grinnell, 74; Hall (C W), 91; Hayden, 62, 67d, 68; Hovey, 02h; Marcou, 58b; Meek, 58, 58b; Newton, 76, 80; O'Harra, 04, 10; Paige, 13; Scott (S), 97; Smith (F C), 98; Stone (R W), 12; Ward (L F), 05; Winchell (N H), 74a, 75  
 Cretaceous: Ward (L F), 94, 99  
 Mesozoic: Darton, 00  
 northern: Frazer, 98a; Irving, 99; Jaggard, 04c; O'Harra (B M), 16  
 pre-Cambrian: Van Hise, 90  
 pre-Cambrian structure: Paige, 16b  
 red beds: Richardson, 03  
 southern: O'Harra, 99  
 Borings: Darton, 97b  
 Cannonball member of Lance formation: Lloyd, 15  
 Cheyenne River Indian Reservation: Calvert, 14  
 Cretaceous: Meek, 56, 56d; Nicollet, 43a  
 Dakota group: Hayden, 67b  
 De Smet quadrangle: Todd, 04a  
 Edgemont quadrangle: Darton, 04a  
 Elk Point quadrangle: Todd, 08  
 Fox Hills sandstone and Lance formation: Stanton, 10a  
 General: Culver, 90, 93; Darton, 09a, 18a; Hayden, 57, 62, 67a; McCaslin, 01; Todd, 95, 95d, 98; Winchell (N H), 75  
 Great Sioux Reservation: Willis, 85  
 Harding Co.: Perisho, 11  
 Harney granite in Black Hills: Ferguson (H G), 08  
 Hell Creek and Ceratops beds: Knowlton, 09g  
 Huron quadrangle: Todd, 04  
 James River valley: Todd, 04b  
 Jurassic, Black Hills: Darton, 99b; Loomis, 02  
 Laccoliths, Black Hills: Jaggard, 01  
 Lance formation: Knowlton, 11a  
 Lignite field, northwestern S. Dak.: Winchester, 16  
 Lincoln Co.: Bendrat, 04  
 Minnehaha Co.: Upham, 85  
 Mitchell quadrangle: Todd, 03b  
 Newcastle quadrangle: Darton, 04  
 Northwestern S. Dak.: Todd, 98  
 Oak Creek formation: Troxell, 16  
 Oelrichs quadrangle: Darton, 02a  
 Olivet quadrangle: Todd, 03  
 Parker quadrangle: Todd, 03a  
 Pipestone quarry: Hayden, 66d  
 Pre-Cambrian of Harney Peak district: Duncan, 12  
 Rosebud Indian Reservation: Reagan, 05  
 Silurian, Black Hills: Beecher, 96d  
 Southeastern S. Dak.: Todd, 00  
 Spotted slates, Minnehaha Co.: Beyer, 95



## South Dakota—Continued.

*Historical geology—Continued.*

- Standing Rock Indian Reservation: Calvert, 14  
 Sundance quadrangle: Darton, 05a  
 Tertiary: Hayden, 69b; Meek, 56d, 57  
 Titanotherium beds: Hatcher, 93a  
 White River beds: Wortman, 93; Sully Springs:  
   Cope, 84b  
 White River Oligocene, mode of deposition:  
   Fraas, 01  
 White River region: Case, 95a; Hayden, 57a;  
   Leidy, 59h

*Mineralogy.*

- Black Hills: Blake (W P), 83a; Scott (S), 97;  
   Wherry, 18e; Ziegler, 14, 14a, c  
 Calcite, Badlands: Farrington, 00  
   lamellar, Keystone: Wherry, 17m  
   siliceous, Washington Co.: Penfield, 00a  
 Cassiterite and other minerals: Headden, 06  
 Columbite, Black Hills: Blake (W P), 84a, b,  
   85d, 91; Headden, 91, 91a  
 Cuprocassiterite, Black Hills: Ulke, 93  
 Graphite, Black Hills: Headden, 91d  
 Iron wolframite: Warren (C H), 01  
 Kehoeite, Lawrence Co.: Headden, 93a  
 Lead district, Homestake mine: Sharwood, 11a  
 Meteorites: Jackson, 63b, 64, 66h; Bath: Foote  
   (A E), 93, 93a  
 Rutile, black, and struverite, identity: Head-  
   den, 17; Black Hills: Headden, 91c  
 Spodumene, Black Hills: Montgomery (H),  
   00; Pennington Co.: Blake (W P), 85a  
 Stannite, Black Hills: Headden, 93  
 Strüverite: Hess, 11a  
 Tantalite, Black Hills: Blake (W P), 84b, 85d  
   Headden, 91, 91a; Schaeffer, 84, 85

*Paleontology.*

- Aceratherium, Miocene: Osborn, 93b  
 Agriochoerus: Scott, 94  
 Alligator, Tertiary: Matthew (W D), 18e  
 Amphisbaenidae: Baur, 93  
 Ancodon: Matthew (W D), 09a  
 Ancodus: Scott, 95  
 Araucarias, Cretaceous: Wieland, 10  
 Archelon, Fort Pierre beds: Wieland, 96, 00  
 Baculites compressus, young: Brown (A P), 91  
 Badlands: Owen (D D), 50a  
 Bennettites, Minnekahta: MacBride, 93  
 Black Hills region: Grinnell, 74, 75; Meek, 58b;  
   O'Harra, 10; Whitfield, 77, 80  
   Cretaceous: Buch, 53  
   Jurassic fauna: Whitfield, 06  
 Brachysaurus, Fort Pierre beds: Williston, 97e  
 Brachyura, Cretaceous: Rathbun, 17  
 Caimanoidea visleri, Oligocene: Mehl, 16  
 Canidae, White River beds: Scott, 98a  
 Cephalopoda: Meek, 56a  
 Cretaceous: Evans (J), 57; Meek, 60b; upper  
   Missouri River region: Hall, 56a  
 Cretaceous flora, Black Hills: Ward (L F), 99,  
   05  
 Cycad: MacBride, 93  
 Cycadeoidea, Black Hills: Ward, 98; Wieland,  
   06b, 16  
 Diceratherium, White River beds: Hatcher,  
   94b  
 Diclonius: Cope, 84ze

## South Dakota—Continued.

*Paleontology—Continued.*

- Egg, fossil: Farrington, 99  
 Elephas, Vermilion: Culver, 89  
 Elotherium, osteology: Scott (W B), 98  
 Embaphias: Cope, 94  
 Eusmilus, Oligocene, S. Dak.: Hatcher, 95a  
 Gastropoda: Meek, 56a; Cretaceous: Meek, 56  
 Heptacodon: Marsh, 94b  
 Heteroceras, Cretaceous: Whitfield, 02a  
 Hoplophoneus occidentalis, White River beds:  
   Riggs, 96a  
 Horse, three-toed, Miocene: Gidley, 03  
 Hyaenodon: Scott (W B), 95a  
 Hyopotamus: Scott (W B), 94a  
 Insectivora: Leidy, 68i  
 Invertebrata, upper Missouri: Meek, 65a  
 Jurassic: Meek, 60b  
 Jurassic fishes, Black Hills: Eastman, 99a  
 Leptauchenia decora, restored skeleton of: Sin-  
   clair, 10a  
 Linuparus, Meade Co.: Ortmann, 97a  
 Mammalia: Leidy, 56e, g, p, 69; Miocene:  
   Matthew (W D), 04b, 07  
 Marine fossils in titanotheres beds: Loomis, 04a  
 Mastodon: Osborn, 18c  
 Megacerops: Lull, 05  
 Mollusca, Cretaceous: Meek, 56b  
   interglacial: Baker (F C), 13b  
 Nothosaurops, Moreau River: Leidy, 70l  
 Obolus and Terebratula, Black Hills: Whit-  
   field, 75  
 Oligocene Mammalia: Matthew (W D), 05  
 Palaeoniscid fish, Permian: Hussakof, 16a  
 Palaeotherium: Prout, 47  
 Paleozoic, list: Bierbauer, 91  
 Pinoxylon, Black Hills: Knowlton, 00c  
 Pisces, Ree Hills: Cope, 91e, 92p  
 Plihippus lullianus, Mission: Troxell, 16  
 Protapirus, Miocene: Wortman, 93a  
 Proterix, Oreodon beds: Matthew (W D), 03c  
 Protoceras, Miocene: Marsh, 91, 97c  
 Protosorex, White River beds: Scott (W B),  
   95c  
 River reptiles, titanotheres beds: Loomis, 04  
 Stegosaurus, Lower Cretaceous: Lucas (F A),  
   01b  
 Symborodon: Cope, 75k  
 Tapir, Miocene: Marsh, 94i  
 Tertiary: Meek, 60b  
 Titanotheres, Oligocene: Osborn, 16  
 Trigonias, Miocene: Lucas (F A), 00a  
 Turtles, new species: Hay (O P), 10c  
 Vertebrata: Leidy, 56i, 69a  
   Badlands: Williston, 95  
   Bijoux Hills: Leidy, 56p  
 White River beds, perissodactyls: Osborn, 95b  
 White River fauna: Scott (W B), 87, 90a, 93

*Petrology.*

- Black Hills: Caswell, 80  
   igneous rocks: Smith (W S T), 07  
   northern: Irving, 99, 04  
 Clay derived from volcanic dust, Pierre forma-  
   tion: Wherry, 17e  
 Granite, Sioux Falls: Todd, 04d  
 Lead district, Homestake mine: Sharwood, 11a  
 Olivine diabase, Minnehaha Co.: Culver, 92a  
 Phonolite, Black Hills: Pirsson, 94a



## South Dakota—Continued.

*Physical geology.*

- Black Hills, igneous intrusions: Russell, 96;  
pre-Cambrian structure: Paige, 16b  
Cross-bedding in White River formation:  
Winchester, 13  
Crystal Cave: Hovey, 04k  
Erosion forms, Harney Peak district: Hovey,  
00f  
General: Darton, 18a  
Granite intrusion, Black Hills: Paige, 14c  
Homestake ore body: Paige, 15  
Laccoliths, Black Hills: Jaggar, 01  
Pre-Cambrian granite of Black Hills, mechanics  
of intrusion: Paige, 16a  
Quartzite, Black Hills: Crosby, 88d  
Sand concretions: Barbour, 01  
Wind Cave: Hovey, 00e

*Physiographic geology.*

- Badlands: Allen (J A), 76b; Darton, 99c; Owen  
(D D), 50a  
Black Hills: Darton, 00b; Gilbert, 80a  
Harney Peak district: Hovey, 00g  
igneous intrusions: Russell, 96  
Tertiary shore lines: Darton, 00a  
Drainage history: Todd, 02  
Drainage modifications in Black Hills: Mans-  
field, 06  
Drift deposits: Todd, 99b  
General: Visser, 18  
Glacial boundary: Wright (C F), 89c  
Lake Arikaree: Todd, 03e  
Missouri River loess: Todd, 06a  
Moraines, Missouri Coteau: Todd, 85, 96;  
southeastern S. Dak.: Todd, 99  
Natural bridge due to stream meandering:  
Barnett, 08  
Pleistocene of Sioux Falls region: Shimek, 12a, b  
Pre-Wisconsin: Todd (J E), 12  
Rosebud Indian Reservation: Reagan, 05  
Stream robbery in Belle Fourche district: Dar-  
ton, 09a  
Wisconsin drift plain, Sioux Falls region: Car-  
man, 13a

*Underground water.*

- Aberdeen-Redfield district: Todd, 09  
Alexandria quadrangle: Todd, 03c  
Artesian basin: Todd, 96c  
Artesian waters: Darton, 96e; Shepard, 95;  
prediction of; Darton, 09c  
Artesian wells: Coffin, 90; Shepard, 96; Updyke,  
90; Upham, 90b, 01c  
Belle Fourche quadrangle: Darton, 09e  
Black Hills: Darton, 01a, 05, 09, 18  
De Smet quadrangle: Todd, 04a  
Edgemont quadrangle: Darton, 04a  
Elk Point quadrangle: Todd, 08  
General: Culver, 90, 93; Darton, 97b, 09a; Hall  
(W S), 93; McCaslin, 01; Todd, 98, 01a  
Huron quadrangle: Todd, 04  
James River valley: Todd, 04b  
Mitchell quadrangle: Todd, 03b  
Oelrichs quadrangle: Darton, 02a  
Olivet quadrangle: Todd, 03  
Parker quadrangle: Todd, 03a  
Southeastern S. Dak.: Todd, 00  
Western S. Dak.: Bailey (G E), 90

- South Lorraine district, Ont.: Phillips (W B), 09  
South Mountain, Pa.: Stose, 06, 07  
South Park coal field, Colo.: Washburne, 10  
South Pass gold district, Wyo.: Beeler, 04b, 08a  
Spanish Peaks folio, Colo. (no. 71): Hills, 01  
Spergen Hill fauna: Hall, 83j; Whitfield, 82  
Sphaerodoma: Keyes, 89h  
Sphenosaurus: Agassiz (L), 49  
Spheroidal weathering of dikes: Kemp, 09a  
Spherulites.  
Artificial lava flow: Pirsson, 10  
California, Hot Springs: Rutley, 90; Little  
Lake: Wright (F E), 16b  
General: Wright (F E), 15  
Mexico: Bárcena: 75c  
Origin: Bucher, 18  
Yellowstone Park: Parkinson, 01a  
Spherulitic crystallization: Am G, 91b  
Spines, origin and significance: Beecher, 98  
Spiraxis: Cope, 95g; Newberry, 85c, g; relationship:  
Hollick, 94d  
Spirophyton: Hall, 63g  
Spongiae.  
American Paleozoic: Ulrich, 90  
Anomaloides: Ulrich, 95  
Archeocyathus: Walcott, 87a  
Astraeospongia meniscus: Hall (J W), 78  
Astylospongia, Lower Helderberg: Hall, 63e  
Beatricea: Hyatt, 65a; Shaler, 77h  
Brachiospongia, Franklin Co., Ky.: Hovey (H  
C), 75; Marsh, 67b; Troost, 38  
Brachiospongiidae: Beecher, 89a  
Calcsponge, Carboniferous, Nebraska: Clarke  
(J M), 97d  
Carboniferous: Girty, 08a; Illinois: Ulrich, 90a  
Cretaceous, New Jersey: Shimer, 13a  
Cryptozoa of Champlain sea: Seely, 06  
Cyathophycus: Walcott, 81a  
Devonian, Michigan: Ulrich, 90a  
Devonian glass sponges: Clarke (J M), 18a  
Dictyophyton: Whitfield, 81a  
Dictyospongiidae: Hall, 84g, i, 87b, 90a, 97e, 98  
General: Hall, 72; James (J F), 95a; Rauff, 93  
Guadalupian: Girty, 08  
Hindia: Hinde, 87  
Illinois, Ordovician: Ulrich, 90b  
Indiana, Cincinnati series: Cumings, 08; Ham-  
ilton group: Whitfield, 05a  
Iowa, burrowing sponge from Devonian:  
Thomas (A O), 11  
Minnesota, Ordovician: Winchell (N H), 95b  
Nepheliospongia, Chemung group, New York:  
Clarke (J M), 00c  
New Brunswick, St. John: Matthew (G F), 90c;  
Silurian: Duncan, 79  
New York, Helderberg: Girty, 97  
Ontario, Hamilton: Walker (A E), 95  
Ordovician: Ulrich, 89a  
Palaeosaccus, Quebec group: Hinde, 93  
Paleozoic, catalog: Head, 95  
Pasceolus: Hyatt, 65a  
Quebec, Little Métis: Dawson (J W), 88f, 90c,  
96; Hinde, 88; Quebec group: Dawson  
(J W), 93d  
Receptaculites: Hall, 63d  
Rhombodictyon: Whitfield, 86a  
Sphenodictya, Marietta, Ohio: Herzer, 01a



**Spongiae—Continued.**

- Steliella, Trenton, Ottawa, Ont.: Hinde, 89  
 Stephanella, Ottawa, Ont.: Hinde, 91  
 Strephochetus: Seely, 85, 86, 02, 08a  
 Tennessee, Decatur: Roemer, 48c  
 Texas, Cretaceous: Merrill (J A), 95  
 Trianisites cliffordi: Rafinesque, 21  
 Uphantaenia: Dawson (J W), 81b; Whitfield, 81a  
 Vermont, Chazy formation: Seely, 02  
 Wingia: Seely, 06a  
 Sporangites: Clarke (J M), 85; Paleozoic: Dawson (J W), 84d  
 Sporocarps, Columbus, Ohio: Dawson (J W), 88g; in Ohio shale: Orton, 89c  
 Spouting well: Sellards, 11a  
 Spring Creek oil field, Tenn.: Munn, 12e  
 Springer, Frank, biography: Keyes, 96n  
 Springfield quadrangle, Ill.: Savage, 07a; Shaw (E W), 13a  
 Spring Valley gorge, Ohio: Scheffel, 07  
 Springs.  
   Colorado, radioactive springs: Wolcott, 04  
   Montana, Giant Springs at Great Falls: Fisher, 08  
   Sinking water table, effects on springs: Hopkins (T C), 10a  
   Springs, siphon: Cleland, 11b  
 Squalidae: Gibbes, 48, 50f  
 Squirrel River region, Alaska: Smith (P S), 11a  
 Stafford limestone, New York: Talbot, 03  
 Staked Plains, Texas: Hill (R T), 90i  
 Stalactites: Brigham, 09; formation: Jackson, 56b; Merrill (G P), 94; Rogers (W B), 56b; of sand: Diller, 99b  
 Standing Rock Indian Reservation, N. and S. Dak.: Calvert, 14  
 Standingstone folio, Tenn. (no. 53): Campbell (M R), 99  
 Stanley Butte district, Ariz.: Wolf, 10  
 Starved Rock State Park, Ill.: Cady, 18  
 Statenliths: Crosby, 14  
 Staunton folio, Va.-W. Va. (no. 14): Darton, 94e  
 Stearns, R. E. C., biography: Dall, 11  
 Steeprock fauna: Walcott, 12a  
 Steeprock Lake, Ont.: Lawson, 12  
 Stegocephala: Baur, 86a, 96a; Broom, 13c; Moodie, 09  
 Stegomus, Triassic, Connecticut Valley: Emerson, 04b  
 Stegosaurus: Gilmore, 14; Lambe, 18; Marsh, 87b; armor: Lucas (F A), 10; Lull, 10c; restoration: Marsh, 91c  
 Stegosaurus unguatus, recently mounted: Lull, 10d  
 Stellerioidea, Paleozoic: Schuchert, 15  
 Stenomylus gracilis: Peterson, 08  
 Stenomylus hitchcocki, mounted skeleton: Peterson, 11a  
 Step faulting, New Jersey, Raritan quadrangle: Bayley, 14  
 Stephanosaurus: Lambe, 14e  
 Sternberg, C. H., autobiography: Sternberg, 09  
 Sternbergia: Dawson (J W), 57d  
 Steubenville quadrangle, W. Va.: Griswold, 07, 07a  
 Stevenson folio, Ala.-Ga.-Tenn. (no. 19): Hayes, 95  
 Stewart River, B. C.: Keele, 06, 06a  
 Stockbridge limestone, Vermont: Dale, 92

Stockton, Utah: Brinsmade, 08b

Stone. *See also* Building stone.

United States: U S G S, 83

Stone Canyon, Cal., coal: Campbell (M R), 07d

Strabops, Missouri: Beecher, 01b

Strafford quadrangle, Vt.: Hitchcock (C H), 12

Strand-line movements, factors in: Barrell, 15; Vaughan, 15c

Strain in rocks: Niles, 71a, 72, 74; Portland, Conn: Johnson (J), 55

**Stratification.**

Arizona, Grand Canyon, peculiar stratification: Blandy, 93b

False bedding in stratified drift deposits: Spurr, 94b

General: Willis, 12

Inclined stratification, Warren Co., N. Y.: Whitney, 57a

Origin: Wells, 51

Pseudostratification, Santa Barbara Co., Cal.: Louderback, 10b, 12

Strata, depth and thickness, graphic method for determining: Palmer (H S), 18

Stratification planes: Keyes, 99b

Superposed strata, nomenclature: Rogers (H D), 57a

Stratigraphic geology. *See* Historical geology; *also* Correlation; Geologic formations, tables; Geologic maps; Nomenclature.

Stream valleys: Rich, 14a

Stream work: Shattuck, 09

Streams, deflection by terrestrial rotation: Baines, 84; Gilbert, 84b

**Streams, piracy.**

Blue Ridge: Davis (W M), 03b

General: Abbe, 99

Georgia, Tallulah district: Johnson (D W), 07, 07c; Jones (S P), 01

Indiana, Bloomington quadrangle: Beede, 11a

Loup Fork rivers: Davis (W M), 92c; Hicks, 92, 92a

Method: Lane, 99b

Michigan, Ypsilanti region: Bowman (I), 04

Missouri, southeastern: Dake, 14

New York, Catskill Mountains: Darton, 96g

North Carolina: Weaver, 97; Hominy Creek: Harris (H L), 93

Pennsylvania, Buck Co.: Ward (R D), 92; Deer Run: Davis (W M), 89g

Tennessee River: Johnson (D W), 05

Utah, Provo and Weber rivers: Anderson (G E), 15

Virginia, Jackson River: Baskerville, 92; Cobb, 93a; western: Watson (T L), 14a

Yellowstone piracy: Goode, 99

Strephochetus: Seely, 85, 86, 02, 08

Strepsicerine antelopes: Merriam (J C), 09a

Stretched pebbles: McCallie, 06; near Ellijay, Ga.: Phalen, 10a

Striations, Yukon and Porcupine rivers, Alaska: Barnett, 08a

Striations and U-shaped valleys produced by other than glacial action: Hovey, 09

Strike, graphical determination: Cameron, 13

Stromatoceria, Isle La Motte, Vt.: Seely, 04

Stromatoliths: Foye, 16

Stromatoporoida. *See* Hydrozoa.



**Strontium.**

Arizona: Phalen, 14

California: Phalen, 14; Barstow: Knopf, 18c

General: Boalich, 18a; Culin, 16d; Meade, 18

United States: U S G S, 83

**Strophalosia:** Beecher, 90c

**Strophomena:** Miller (S A), 97a

**Strophostylus:** Keyes, 90d

**Structural geology.** *See* Physical geology.

**Structural materials.** *See also* Building stone; Clay; *etc.*

Field investigations: Burchard, 10

Illinois: Udden (Jon A), 10b

Literature: Eckel, 02c

Mexico: Tello, 17

Minnesota: Burchard, 10a

Mississippi: Logan, 11

Oklahoma: Gould, 11b

Texas: Burchard, 10b

United States: U S G S, 83

Structure of Great Plains: Darton, 18a

Study and teaching. *See* Educational.

Sturgeon Lake gold field: Moore (E S), 11a

Sturgeon River district, Mich.: Bayley, 99

Stylacodon, Jurassic: Marsh, 79e

Stylinodontia, Eocene edentates: Marsh, 97

**Stylolites.** *See also* Lignilites.

Colorado, Breckenridge, in quartzite: Tarr (W A), 16

General: Hopkins, 97d, 08; Todd, 13a

Origin: Nelson (E T), 79

Stylolitic structure in Tennessee marble, origin: Gordon (C H), 18a; in limestone, origin: Irving, 04a

Stylonurus, restoration: Beecher, 00a

Submarine banks: Davis (W M), 18

Submarine channels, continental shelf: Spencer (J W), 03, 05b; Upham, 92e

Submerged trees, Columbia River: Dutton, 87; Emmons (S F), 87c; Gilbert, 99; Wright (G F), 06

Submerged valleys: Davis (W M), 13a

Subsidence. *See* Changes of level.

Subsidence, mining: Knox, 14

Subsidence basins, High Plains: Johnson (W D), 99b

Subterranean water. *See* Underground water.

Subtuberant mountains: Emmons (S F), 99

Sudbury area. *See* Ontario.

Sudbury series: Coleman, 14a

Suess, Edward, biography: Hobbs, 14b

Sugarloaf district, Boulder Co., Colo.: Crawford (R D), 09

Sullivan district, Maine: Kempton, 79

Sulphate of soda.

California, San Luis Obispo County: Arnold, 09d

Wyoming, Laramie Basin: Darton, 09f; Laramie and Sherman quadrangles: Darton, 10c

**Sulphides, replacement by quartz:** Wolcott, 17

**Sulphur.**

General: Phalen, 08e; Smith (P S), 18

Genesis: Stutzer, 12

Louisiana, Belle Isle: Lucas (A F), 17

Maine, central, pyrrhotite: Bastin, 17b

New Mexico, Jemez Canyon: Mansfield (G R), 18a

**Sulphur—Continued.**

Occurrence: Shaw (E W), 15f

Texas, Rustler Springs: Porch, 17; trans-Pecos region: Thomas (K), 18a

United States: Pogue, 17c; U S G S, 83

Sulphur in rocks and in river waters: Shaw (E W), 15f

Sulphur Spring Valley, Ariz.: Meinzer, 13

Sulphur Springs deposits: Siebenthal, 14

Summerland district, Cal.: oil: Arnold, 07e

Sumpter quadrangle, Oreg.: Pardee, 14

Sunbury shale, Ohio: Prosser, 02

Sun-crack structure: Stose, 11; Wherry, 12c

Sundance folio, Wyo-S. Dak. (no. 127): Darton, 05a

Sunlight district, Wyo.: East, 11

Sunol Valley, Cal.: Branner, 12b

Sun River district, Mont.: Powers, 14

Surveys.

Alabama: Smith (E A), 73, 75, 88, 90, 92, 94c, 96, 02

Arkansas: Branner, 87b, 88, 94a

California: Hamilton, 16; Storms, 12c; Whitney, 63, 64b, 65, 65a, 66, 67, 68a, 73; continuance of survey: Cal Ac Sc, 76

Canada: Can Parl, 55; Dowling, 00d; Ells, 92b, 95g, 96f; Klittke, 97; Walker (B E), 00; Walker (T L), 05; Logan, 58, 66; reports: Bell (R), 02a, 06; Brock, 08; Dawson (G M), 95a; Low, 06b; McConnell, 15; McInnes, 17; Selwyn, 72, 79, 85

Department of mines: Tyrrell, 06; organization and work: Wilson (A W G), 10a

Topographic survey needed: Adams (F D), 06c

Catalog of reports: Marsh, 67a; Prime, 79

Colorado Geological Survey, report: George (R D), 09a

Colorado River of the West: Powell, 72, 73, 74

Connecticut: Conn G S, 04; report: Gregory (H E), 17a

Delaware: Booth, 39

Economic value: Murray, 69

Educational bulletins: Fenneman, 11a

Federal Government, relation to the mining industry: Hayes, 06

Florida: Sellards, 08, 18; organization and plans: Sellards, 07a

Fortieth parallel survey: King (C), 71, 72, 73, 74, 75, 76, 77, 78; Newberry, 79c

General: Brown (R J), 85; Clark (W B), 17; Jackson, 36a; Klittke, 96; Stoek, 96; Winchell (A), 67a

Geographic work: Davis (W M), 94d

Geographical and geological surveys: Whitney, 75

Geological surveys: Hayden, 78b; Powell, 78a

Georgia, report: Spencer (J W), 91; Yeates, 93, 94

Government geologic surveys: Smith (G O), 18a  
Hayden, King, Powell, and Wheeler surveys, publications: Schmeckebier, 04

Hayden survey: Hayden, 76e, 77, 77d, f, 78c, d

Historical: Clark (W B), 17

Illinois: Bain, 07d; DeWolf, 09a, 10, 12, 15; Norwood, 53

Indiana: Barrett, 12, 18; Blatchley (W S), 96, 17; Collett, 83, 84, 84b; Gorby, 92; Owen (D D), 38, 61a; index to reports: Hopkins (T C), 04b



## Surveys—Continued.

- Iowa: Arey, 12; Calvin, 93c, 09c; Hall, 60h; White (C A), 68; Wilder, 05; reports: Kay, 12, 14b, c, 16a, 17
- Kansas: Haworth, 96, 08c
- Kentucky: Shaler, 74, 77b; reports: Norwood, 05a; Proctor, 82; Shaler, 77a, c, e, 80
- King survey: Pumpelly, 79a
- Maine: Bayley, 90; Me St S Comm, 07
- Maryland: Clark (W B), 97, 98a, 07a, 17
- Massachusetts: Mass, H R, 37; Mass, St Bd Educ, 74
- Mexico: Paredes, 17; Instituto Geológico: Aguilera 09d; Guild, 05a; Chihuahua, northeastern: Rogers (R V), 09
- Michigan, reports: Allen (R C), 14b; Houghton (D), 42; Hubbard (L L), 99; Lane, 00d, 01b, 02, 03, 05; Rominger, 93; Wadsworth, 93; Winchell (A), 61; Wright (C E), 93
- Minnesota, reports: Emmons (W H), 16; Winchell (N H), 73b, 77, 84, 89, 94, 03b
- Mississippi: Hilgard, 00; reports: Lowe, 14
- Missouri: Buckley, 03a; Buehler, 09; Gallaher, 98, 01; Keyes, 95e  
history: Broadhead, 86, 01; Pumpelly, 73  
reports: Hager, 71; Sampson, 93; Swallow, 55, 57, 59, 61; Trowbridge (S H), 83; Winslow, 90, 91, 94b
- Nebraska, initial work: Barbour, 00, 02c, 12b
- New Hampshire: Hitchcock (C H), 69, 70, 72, 73, 74c, 96; report: Jackson, 42, 44
- New Jersey: Cook (G H), 64, 65-89; Kitchell, 55, 56, 57; Kummel, 02, 03, 11, 16; Smock, 91-01
- New York: Clarke (J M), 99b, 06, 15; Mather, 37a  
paleontology, progress: Hall, 51a  
report of State geologist: Hall, 83, 83o, 84a, c, 85a, 86, 86d, 87a, 88b, 89, 90, 91, 92, 93a, 94, 95, 97, 97b, c, 99, 99a; Merrill (F J H), 01, 02a, 03, 04, 04a  
geological survey, condition 1843: Hall, 43a
- North Carolina: Holmes (J A), 89, 93, 94; Kerr, 67, 75; State geologist's report: Pratt, 07
- North Dakota: Leonard, 04, 08, 12a; Wilder, 02a
- Ohio: Mather, 38, 38a; Orton, 93, 94, 03; Prosser (C S), 06; progress 1870: Newberry, 71a, 72
- Oklahoma geological survey: Gould, 00e, 08, 10; Okla G S, 08; Van Vleet, 02
- Oregon: Oreg B M, 15; Parks (H M), 16; Williams (I A), 15
- Organization, etc.: Klittke, 96
- Organization and cost: White (D), 17a
- Pennsylvania: Ashburner, 81a  
index to reports: Ingham, 95  
publications: Ashburner, 85e  
reports: Lesley, 75, 76, 83c, 86-89; Pa G S, 76; Pa Top G S Com, 02, 06, 08, 11, 12, 14; Rogers (H D), 36a, 38-42; summary 1874-1887: Lesley, 87
- Powell survey, 1877: Anon, 78
- Records, keeping: Buckley, 04a
- Relations of State and national surveys: Branner, 90a
- Rhode Island: Rhode Island, 76; report: Brown (C W), 10

## Surveys—Continued.

- Rocky Mountain region, survey, report: Powell, 77
- South Carolina: Holmes (J A), 91; report 1911: Twitchell, 12
- South Dakota: Perisho, 10a, 14; reports: Todd, 98; Ward (F), 16, 18
- State geological surveys: Carney, 08a; DeWolf, 14; Hayes, 11; Klittke, 96; Leeds, 73a; Thompson (A H), 87  
work of: Bain, 10a; Mathews, 11
- State geologist's report, what it should contain: Bain, 06d; Clark (W B), 06e; Clarke (J M), 06a; Leonard, 06b; Perisho, 07
- Surveys existing in 1878: Blake (W P), 80a
- Surveys of territories, report: Hayden, 73a
- Surveys of the West: Scudder, 78c
- Surveys west of the 100th meridian, reports: Macomb, 81, 82, 83; Wheeler (G M), 72a, 73, 74, 74a, 75, 75a, 76, 77, 78, 79, 80, 84
- Tennessee: Glenn, 12b; reports: Purdue, 14, 17; Safford, 89
- Texas: Hill (R T), 87; Shumard (B F), 60f; report: Stiles, 16
- United States: Gilbert, 86c; Klittke, 96
- United States Geological and Geographical Survey of the Territories: Hayden, 76, 77, 77d, 78, 78a, 83
- United States Geological Survey: Chapman (R H), 10; Inst. Government Research, 18; Irving, 83g; Le Conte, 84b; Marcou, 92b, c; Smith (G O), 12, 13a; U S G S, 04  
areal work: McGee, 92a, 93  
chemical work: Clarke (F W), 10b  
organization, etc.: Powell, 85c  
relations to other geological surveys: Walcott, 06a  
reports: King (C), 80; Powell, 82, 83, 84, 85, 85a, b, 86, 88, 88a, 89a, 90, 91, 91a, 92, 93, 93a, 95; Smith (G O), 07; Walcott, 96, 02, work of: Smith (G O), 07e, 11; Walcott, 95, 01a; Willis, 99a, 00b  
work on mineral resources: Walcott, 01a
- United States Geological Survey of the Territories, report: Hayden, 79
- Utility: Prout, 51
- Vermont: Adams (C B), 46; State geologist's reports: Perkins (G H), 02
- Virginia: Hotchkiss, 82d; Rogers (W B), 84d; survey reports: Watson, 10e
- War Department surveys: Humphreys, 78, 78a
- Washington: Landes, 02; reports: Wash G S, 03, 10
- West Virginia: White (I C), 98, 99, 02
- Western States: Le Conte (J L), 68
- Wheeler survey, Nevada, Utah, and Arizona, report: Wheeler (G M), 72b
- Wisconsin: Blake (W P), 93c; reports: Birge, 99; Chamberlin (T C), 77; Wight, 77; Wis G S, 99
- Wyoming, report: Jamison, 12b; 1913-4: Trumbull, 14b
- Susitna basin, Alaska: Eldridge, 00; Moffit, 11, 12
- Sussex coal field, Johnson, Natrona, and Converse cos., Wyo.: Wegemann, 12a
- Sutton, W. J., biography: Robertson (W F), 16
- Sutton formation, Vancouver Island: Clapp (C H), 11a



**Swamps.**

- Dismal Swamp, Virginia: Shaw (E W), 11h;  
Webster (N B), 75  
Fresh-water morasses: Shaler, 90  
Massachusetts, Lynn: Mudge, 62a  
New England: Shaler, 85, 87  
North Carolina: Davis (C A), 08b  
Tide marshes of United States: Nesbit, 85  
United States: Shaler, 86a; eastern: Shaler, 85  
**Swallow**, G. C., biography: Broadhead, 99  
**Swastika** gold area: Bruce, 12  
Sweetland Creek beds: Udden, 99a, 12a  
**Sylvania** sand, Cuyahoga Co., Ohio: Neff, 90  
**Sylvania** sandstone: Grabau, 07h; origin: Sherzer, 10  
**Sylvanite**, N. Mex.: Dinsmore, 08a; Jones (F A), 08a  
**Symborodon**: Cope, 75k  
**Synarida**: Packard (A S), 86  
**Synclitorium**, Great Plains region: Keyes, 15p  
**Syringopleura** Schuchert: Girty, 11a  
**Tables** of geologic formations. *See* Geologic formations, tables.  
**Tacoma** folio, Wash. (no. 54): Willis, 99  
**Taconic** fossils: Hall, 55; Walcott, 88c  
**Taconic** Mountains: Winchell (N H), 90c  
**Taconic** question: Am G, 90b, c; Barrande, 61, 61a; Billings, 63a, 72b, e; Bishop, 86a; Dana (J D), 72b, g, h, i, 77b, 79a, 80a, c, 84, 84a, 85b, 86a, c, e; Darton, 86a; Ford (S W), 80a, 86; Haldeman, 45; Hall, 61, 62l; Hitchcock (C H), 76a, 88; Hitchcock (E), 59b; Hunt, 61d, 62a, 80a, 83a, 86, 87b; Hyatt, 88a; Keith, 12; Marcou, 62a, b, 64a, 81, 85, 86, 87, 88a, b, 89, 89a, c, 90c, 97; Perry, 68; Selwyn, 88, 88a; Vogdes, 88b; Walcott, 86, 87, 88; Winchell (A), 88c; Winchell (N H), 86c, 87a, 88g, 90b, 97c, d; history: Dana (J D), 88  
**Taconic** rocks: Adams (C B), 47c  
**Taconic** schists, Hudson River age of: Dana (J D), 79a  
**Taconic** specimens: Hall, 89a  
**Taconic** system: Barrande, 60a; Dana (J D), 61, 73b; Emmons (E), 42, 44, 46, 46f, 54; Hall, 62o; Hitchcock (C H), 61d; Hitchcock (E), 61; Hunt, 51, 61a, d, 78a; Marcou, 60a, 61c; Miller (S A), 88; Rogers (W B), 61f; Stevens (R P), 60; Winchell (N H), 88e  
geologic age: Dana (J D), 82b  
North Carolina: Emmons (E), 56  
**Taeniopteris**, revision of: Berry, 10f  
**Tahlequah** folio, Okla. (no. 122): Taff, 05  
**Talamanca**, Costa Rica: Gabb, 95  
**Talc.**  
General: Diller, 09b; Pratt, 01g  
genesis: Julien, 14  
New York, St. Lawrence Co.: Nevius, 99b;  
genesis: Smyth (C H), 96 b  
North Carolina: Pratt, 00  
Origin: Jacobs, 14  
United States: U S G S, 83  
Vermont: Jacobs (E C), 16a  
**Taligra**da: Osborn, 98e  
**Talkeetna** basin, Alaska: Paige, 07a, b  
**Tallow** clays, Missouri: Seamon, 90a  
**Tallula-Springfield** folio, Ill. (no. 188): Shaw (E W), 13a

- Tallulah** district, Ga.: Johnson (D W), 07, 07c  
**Talus**; **San Juan** Mountains: Spencer (A C), 00a  
**Tamiosoma**: Dall, 02a  
**Tangier** gold deposits, N. S.: Packard (G A), 07a  
**Tantalum**.  
General: Baskerville, 08; James (C), 17  
South Dakota: Hess, 09  
**Taonurus**: Sarle, 06a  
**Tarsands** of **Athabasca** River: Bell (R), 08a; McConnell, 91b  
**Taral** district, Alaska: Moffit, 12a  
**Tarr**, R. S., biography: Brigham (A P), 15; Martin (L), 15a; Williams (H S), 12a; Woodworth, 13a; Anon, 12b  
**Taylor** Peak iron deposit, Colo.: Harder, 09  
**Taylorville** region, Cal.: Diller, 08b  
**Tazewell** folio, Va.-W. Va. (no. 44): Campbell (M R), 97  
**Teaching**. *See* Educational  
**Teapot** dome, Wyo.: Wegemann, 18  
**Technique**.  
Amphibia, methods of study: Moodie, 15  
Analysis of rocks: Connor, 13; of silicate and carbonate rocks: Hillebrand, 10  
Apparatus for instruction in structural geology: Hobbs, 08b, 09a; for laboratory: Wolff, 94b  
Attachment for metallographic microscope: Brokaw, 16b  
Auger, earth: Darton, 91e  
Barium in rocks, determination of; Langley, 08  
Bi-quartz wedge plate: Wright (F E), 08b  
Cleaning fossils with caustic potash: Böse, 07b  
Collecting and preparing fossils: Schuchert, 95  
Collecting fossils: Kindle, 16d  
Collecting minerals, directions for: Tassin, 95  
Collecting rocks: Merrill (G P), 95a  
Color plate photographs of rocks: Levison, 13  
Color scheme for crystal models: Chadwick, 12  
Compass clinometer: Russell, 78c  
Contact goniometer: Penfield, 00f  
Contour projection: Smith (W S T), 14  
Crystal drawing: Penfield, 05; Stöber's method: Rogers (A F), 07  
Crystallized mineral specimens, developing: Grenzig, 18; Hawkins, 17  
Crystallography, graphic methods: Penfield, 02  
Crystallography, teaching of: Kraus, 06a; Rogers (A F), 06a  
Demonstrating ore formations, new method of: Nicholas, 09  
Determination of calcium and magnesium in rocks: Knight (N), 06  
feldspars: Wright (F E), 06a  
geometrical constants of a crystal from its interfacial angles: Moses, 06  
hardness of minerals: Kip, 07  
magnesia, in the field: Catlett, 07a  
minerals, by petrographic methods: Tomlinson, 06; by the polarizing microscope: Rogers (A F), 06  
minerals of nonmetallic luster: Moses, 13  
Diatomaceae, disintegrating: Bailey (J W), 56  
Dip, projection of, graphic method: Palmer (H S), 18  
Dip protractor: Wentworth, 17  
Drawing board for stereographic projection: Johannsen, 11a



## Technique—Continued.

- Drawing of crystals from stereographic and gnomonic projections: Penfield, 06
- Etching meteorites for photographic purposes: Preston, 06
- Fault finder: Simons, 14a; Weeks (W S), 14
- Field geology: Lahee, 16
- Field work: Hayes, 09; Hobbs, 01f
- Field-work methods: Roark, 18
- Fossil skeletons, excavating, preparing, and mounting: Hermann, 08
- Fossils, preparation of: Grabau, 09f
- Fossils, preparation and mounting: Barbour (C A), 98
- Fossils, removing tests from: Buckman (S S), 11
- Geologic field methods: Irving, 13; Moon, 13
- Geologic mapping: Eckel, 01c; Paige, 14
- Geologic mensuration: Harris (G D), 04
- Geologic reports: Irving, 13a
- Geologic short-cuts: Mead (W J), 12
- Gnomonic projection: Penfield, 06; Rogers (A F), 07a
- Goniometer: Rogers (A F), 08
- axial: Winchell (N H), 96
- crystal-grinding: Wright (F E), 15a
- Granularity limits in petrographic microscopic work: Wright (F E), 12a
- Graphic methods for solution of geologic problems: Smith (W S T), 14
- Graphic methods in microscopical petrography: Wright (F E), 13d
- Graphic plot for plagioclase feldspars: Wright (F E), 13e
- Handbook for field geologists: Hayes, 09
- Inclination of surface, determination from contour map: Rich, 17
- Inclined strata, thickness, calculation of: Chapman (E J), 60f
- Index of refraction: Hotchkiss, 05
- Index ellipsoid in petrographic-microscopic work: Wright (F E), 13a
- Instrumental surveying needed in practical geology: Lyman, 09
- Interference figures, observation of, by the microscope: Wright (F E), 06b
- Interference-phenomena device: Wright (F E), 08d
- Laboratory methods in vertebrate paleontology: Hermann, 09
- Lens for interference figures: Johannsen, 13
- Lettering figures of crystals: Dana (J D), 52a
- Level, reflecting: Locke, 43
- Machine-made line drawings: Daly (R A), 05c
- Magnesia, field test for: Catlett, 07
- Mapping crystalline schists: Hobbs, 02a
- Mapping in the field: Hoskins, 11
- Measurement of extinction angles: Wright (F E), 03a
- Measurement of strata: Hewett, 15
- Measuring temperature in deep wells: Van Orstrand, 18
- Measuring thickness of inclined strata: Walcott, 89a
- Microscope, use in petrography: Hobbs, 88b
- Microscope, reflecting: Ray, 14a

## Technique—Continued.

- Microscopic examination of opaque minerals: Campbell (W), 06
- Microscopic petrography: Wright (F E), 04
- Microsklerometer: Jaggard, 98b
- Microslides, preparation: Fritz-Gaertner, 78
- Microspectroscope in mineralogy: Wherry, 15
- Mineragraphy: Whitehead, 17
- Mineral analysis: Clarke (F W), 68
- Mineral collection: Duce, 17
- Mineralogical analysis of sand: Tomlinson, 15
- Modeling machine: Mathews, 00a
- Mounting of fossils: Hill (F C), 86
- Multiple rock diagrams: Grout, 18d
- Natural molds of fossils, impressions of: Slocum, 07
- Nomographic solutions of certain stratigraphic measurements: Palmer (H S), 16
- Notation for rocks: Dana (J D), 85
- Oblique illumination in petrographic microscope work: Wright (F E), 13
- Ocular for petrographic microscope: Wright (F E), 10a
- Optic axial angle of minerals, measurement of: Wright (F E), 07
- Optic angle of gypsum: Kraus, 12
- Optical properties of minerals, determination of: Wright (F E), 12
- Optical study of the lime-silica series of minerals: Wright (F E), 06d
- Panel mounting: Barbour (E H), 09c
- Petrographic description: Berkey, 13
- Petrographic microscope: Williams (G H), 88; Winchell (N H), 89d; Wright (F E), 10, 11, 17a
- combination wedge: Wright (F E), 02
- improvements for: Johannsen, 10; Wright (F E), 11a
- Petrographic microscope work, index ellipsoid: Wright (F E), 13a
- Petrographic-microscopic methods: Wright (F E), 11
- Petrographic reports: Tomlinson, 14
- Petrography: Hensoldt, 89; Luquer, 92
- Petrology: Herrick, 85
- Photographing sutures of ammonites: Böse, 07a
- Photography of fossils: Burling, 11; Van Ingen, 01b; Williams (H S), 01a; with gum dammar: Hudson, 11
- Plane-table mapping: Higgins, 13; Pelton, 12; Ransome, 12a; Wegemann, 12b
- Pneumatic tools for fossil cleaning: Riggs, 03c
- Polarizer in petrographic microscope: Wright (F E), 15b
- Power chisel: Morse, 16b
- Preparation of a report: Van Ingen, 16
- Protractor: Penfield, 00f; geological: Wright (F E), 16
- Recording data concerning ore deposits: Rice (C T), 10
- Recording micrometer for geometrical rock analysis: Shand, 16
- Records, keeping: Kemp, 05a
- Refraction, index: Lane, 12d
- Refractive indices: Merwin, 13a
- Removing tests from fossils: Buckman, 11



**Technique—Continued.**

- Representation of land forms in the physiography laboratory: Tarr, 03a  
 Rock analyses, conversion of: Mead (W J), 12  
 Rock sections, preparation: Dwight, 90; Flagg, 13b; Hensoldt, 89; Luquer, 92; Mackenzie, 03; Merrill (G P), 95a  
 Rocks, composition: Lincoln, 13a  
 Sand blast for cleaning fossils: Osborn, 04l  
 Section-cutting machine: Williams (G H), 93b  
 Sections, construction in field work: Campbell (M R), 97b; Chance, 81  
 Seismograph at American Museum: Hovey, 12d  
 Seismographic bookkeeping: Wood (H O), 12d  
 Seismographs: Reid (H F), 12a; vertical motion: Perret, 13f  
 Skiagraphy of fossils: Field, 15a  
 Slide rule in rock analyses: Hance, 15  
 Stereograms in paleobiology: Hudson (G H), 13  
 Stereographic projection: Penfield, 01  
 Strata, depth and thickness, graphic method for determining: Palmer (H S), 18  
 Sulphur mounting of specimens: Reeds, 14a  
 Temperature measurement in bore holes: Johnston (J), 16b  
 Tests for metals in minerals: Fansett, 18  
 Valuation of coal beds: Rogers (G S), 14c  
 Vertebrate fossils, preparation: Osborn, 01c  
 Tectonic lines of northern part of North American Cordillera: Joerg, 10  
 Tehachapi Valley, Cal.: Lawson, 06b  
 Tehuantepec Isthmus: Spencer (J W), 97  
 Tejon group, age: Cooper (J G), 74c  
 Tektites: Merrill (G P), 11  
 Telemeter with micrometer screw adjustment: Wright (F E), 08c  
 Teleoceras, Nebraska: Olcott, 09  
 Teleorhinus, Cretaceous, Montana: Osborn, 04c  
 Telkwa district, B. C.: Dolmage, 18; Leach, 06, 07  
 Telluride folio, Colo. (no. 57): Cross, 99  
 Telluride quadrangle, Colo.: Hole, 12a  
 Tellurides: Lenher, 09  
 Tellurium.  
     Connecticut: Silliman, 19a  
     United States: U S G S, 83  
 Tellurium-bearing gold ores: Sharwood, 11  
 Telmatocyon, Bridger beds: Marsh, 99a  
 Temagami silver district, Ont.: Mattair, 07  
 Temblor Basin, Cal.: Anderson (F M), 14  
 Temperature measurement in bore holes: Johnston (J), 16b; Van Orstrand, 18; Pittsburgh, Pa.: Hallock, 97; Wheeling, W. Va.: Hallock, 97  
 Tenmile district special folio, Colo. (no. 48): Emmons (S F), 98  
**Tennessee.**  
 Agricultural geology: Safford, 85  
 Bibliography of Tennessee geology: Cockrill, 11  
 Camden chert: Ashley, 11c  
 Cave deposits, composition: Glenn, 18a  
 Eastern Tenn.: Britton (N L), 86; Willcox, 74  
 Elementary geology: Safford, 76  
 Elementary textbook: McAdoo, 81  
 Erratic boulder, coal measures: McCallie, 03  
 Etowah, McMinn Co.: Purdue, 13  
 General: Cornelius, 19; Glenn, 12b; Kain, 18; Safford, 00; Troost, 31

**Tennessee—Continued.**

- Gulf embayment area: Glenn, 06c  
 Nashville, sanitary geology: Winchell (A), 79a  
 Nashville area: Safford, 77  
 Soil geology: Safford, 84  
 Soils: Mooers, 15  
 Report of geological survey: Ashley, 10a, 11; Purdue, 12a, 14, 17; Safford, 57, 60, 89; Troost, 33  
**Economic geology.**  
 Aluminum and bauxite mining: Ashley, 12c  
 Barite: Judd, 07b; Watson (T L), 15  
     Cocke Co.: Weller (C A), 07  
     Sweetwater district: Gordon (C H), 18; Hene-gar, 12  
 Barite and fluorite: Watson, 07  
 Bauxite: Ashley, 11, 12b; Purdue, 14b; Elizabethtown: Watkins, 13  
 Briceville quadrangle: Keith, 96b  
 Bristol-Big Stone Gap section: Boyd (C R), 87  
 Building stone: Hawes, 84  
 Cave deposits, composition: Glenn, 18a  
 Cave marble (cave onyx): Gordon (C H), 12  
 Cement resources: Gordon (C H), 11c; Eckel, 13; Ulrich, 05a; Cumberland Gap district: Eckel, 06d  
 Chattanooga district: McCreath, 87a  
 Chattanooga quadrangle: Hayes, 94b  
 Clay: Ashley, 10b  
     Henry Co.: Kirkpatrick (F A), 12  
     Western Tenn.: Crider, 06a; Eckel, 03b; Nelson (W A), 11  
 Cleveland quadrangle: Hayes, 95a  
 Clinton iron ore: MacFarlane, 13; Whinery, 12; Chattanooga region: Burchard, 09a  
 Coal: Ashley, 10b, 11e; Colton, 83, 86; Hayes, 02b; Killebrew, 78c, 81; Porter (J B), 87; Safford, 89, 93; Troost, 35  
 Cumberland Gap field: Ashley, 04, 04a; Lesley, 55; Pultz, 07  
 Cumberland Plateau: Duffield, 02  
 Jellico field: Evans (A W), 05  
 Little Sequatchie Valley: Killebrew, 76a  
 McMinnville quadrangle: Hayes, 95c  
 New River field: Colton, 86  
 north of Tennessee Central Railroad: Glenn 13  
     northern field: Glenn (L C), 16  
     Pikeville quadrangle: Butts, 17; Phalen, 11  
     Sewanee quadrangle: Hayes, 94c  
     south of Tennessee Central Railroad: Nelson, 13, 16  
     Standingstone quadrangle: Campbell (M R), 99  
     Tracy City: Brown (C S), 92  
     Wartburg quadrangle: Keith, 97  
 Cocke Co.: Troost, 40  
 Columbia quadrangle: Hayes, 03  
 Coosa Valley: McCalley, 97  
 Copper: Ashley, 10b; Weed, 02e, 06, 11; Whitney, 55a  
 Ducktown: Ansted, 57; Bray, 55; Brewer, 95; Currey, 55, 57a; Emmons (W H), 11; Gilbert, 13; Henrich, 96; Hunt, 73e, 74h; Kemp, 02b; McCallie, 02; Shepard, 59b; Thompson (A P), 14; Tuomey, 55; Wende-born, 03; Whitney, 53



**Tennessee—Continued.***Economic geology—Continued.*

Copper: eastern Tenn.: Christy, 58a  
 Polk Co.: Jackson, 54c; Killebrew, 76b  
 Cranberry quadrangle: Keith, 03  
 Dolomite, Johnson Co.: Jenkins, 16  
 eastern Tenn.: Christy, 58a.; Cowlam, 88;  
 Killebrew, 76c; Procter, 88  
 Ellijay quadrangle: LaForge, 13  
 General: Currey, 54, 56, 57, 57a; Killebrew,  
 74b; Purdue, 13c; Safford, 56, 69, 87, 89;  
 Troost, 31, 35, 43, 45  
 Gold: Pratt, 02h; Coker Creek, Monroe Co.:  
 Ashley, 11d  
 Granites: Watson, 10  
 Gravels, west Tennessee valley: Wade, 17b  
 Greeneville quadrangle: Keith, 05  
 Iron: Ashley, 10b; Chauvenet, 86; Gordon (C H),  
 13a; Judd (E K), 07; Killebrew, 81;  
 Porter (J B), 87; Willis, 86a  
 Chattanooga district: Burchard, 09a; Flem-  
 ing, 87; Higgins (E), 09  
 Clinton ore: MacFarlane, 13; Whinery, 12  
 Cranberry district: Keith, 03a  
 drift hematite deposits, eastern Tenn.:  
 Nichols, 82  
 eastern Tenn.: Burchard, 13a, 14a; Jarvis, 12;  
 Maxwell, 04; types of deposits: Gordon  
 (C H), 14a  
 Ellijay quadrangle: LaForge, 13  
 Fernvale Davidson Co.: Nelson (W A), 11a  
 Lawrence and Wayne cos.: Purdue, 12e  
 Lewis Co.: Rogers (R F), 15  
 magnetite, Carter Co.: Chase, 96  
 northeastern Tenn.: Johnson (G R), 97  
 Roan Mountain quadrangle: Keith, 07b  
 Sequatchie Valley: Bowron, 86  
 Shady Valley: Garrison, 04a  
 Sweetwater district: Judd (E K), 07  
 Tuckahoe district: Gordon (C H), 12a  
 Washington Co.: Lesley, 72  
 western belt: Killebrew, 88, 91  
 Jefferson Co.: Troost, 48  
 Kingston quadrangle: Hayes, 94a  
 Knoxville quadrangle: Keith, 95  
 Lead: Ashley, 10b; Nelson, 12  
 Lead and zinc deposits: Watson, 06a  
 Lignite and lignitic clay: Nelson, 12a  
 Limestone: Eckel, 13  
 Lithographic stone: Howe, 86  
 Loudon quadrangle: Keith, 96  
 McMinnville quadrangle: Hayes, 95c  
 Manganese: Harder, 10; Nelson (W A), 11b;  
 Watkins, 16  
 Bradley Co.: Purdue, 18  
 eastern Tenn.: Purdue, 16c; Stose, 18  
 Marble: Ashley, 10b; Gordon (C H), 11b, 12;  
 Keith, 03b; Hawkins Co.: Willis, 88  
 Maynardville quadrangle: Keith, 01  
 Memphis, drilling for oil and gas: Ashley, 11a  
 Mineral paint ore: Burchard, 07e  
 Mineral products along Tennessee Central Rail-  
 road: Nelson, 13a  
 Mineral resources: Ashley, 10b, 11b; Colton,  
 83; Killebrew, 74a, 76; McWhirter, 85  
 eastern Tenn.: Brewer, 96  
 Ocoee and Hiwassee district: Killebrew, 76b

**Tennessee—Continued.***Economic geology—Continued.*

Morristown quadrangle: Keith, 96a  
 Natural gas: Ashley, 10b, 12a; Munn, 11b;  
 Safford, 87b  
 Ocoee and Hiwassee district: Killebrew, 76b  
 Ocoee district: Troost, 37  
 Oil, black shales: Ashley, 17  
 Oil and gas: Ashley, 12a  
 Oil and gas conditions, central basin: Purdue,  
 16a; Reelfoot Lake district: Purdue, 16b  
 Oil and gas developments: Munn, 11b  
 Oil and gas possibilities, Highland rim: Pur-  
 due, 17b  
 Onyx deposits: Gordon (C H), 12  
 Petroleum: Ashley, 10b, 12a; Fuller, 17; Kille-  
 brew, 77, 78; Munn, 11b; Safford, 66  
 Glenmary, Scott Co.: Glenn (L C), 17, 18b;  
 Purdue, 17a  
 Memphis: Munn, 12d  
 northeastern Tenn.: Schmitz, 96a  
 Oneida, Scott Co.: Glenn (L C), 15a  
 Phosphate: Ashley, 10b; Barr, 14; Brown  
 (L P), 05, 14a; Eckel, 01a; Hayes, 95e,  
 96a, 99f, 00d, 01c, 03l; Johnson (R D O),  
 05; Maynard, 14; Meadows, 94, 95; Pha-  
 len, 16a; Ruhm, 07; Safford, 94a, 95; Van  
 Horn (F B), 09; Waggaman, 12  
 brown: Hayes, 00d  
 Columbia quadrangle: Hayes, 03  
 Decatur Co.: Eckel, 03d; Maynard, 13b  
 Hickman Co.: Killebrew, 98; Phillips (W B),  
 94, 94a  
 Johnson Co.: Jenkins, 16; Watkins, 15c  
 Maury Co.: Killebrew, 96, 98a  
 middle Tenn.: Safford, 96  
 Mount Pleasant: Ruhm, 03  
 Perry Co.: Hayes, 96b  
 south central Tenn.: Brown (L P), 14; Hook,  
 14  
 white: Eckel, 03d; Hayes, 01b, 03j; Hook, 15  
 Phosphate horizons: Safford, 01a  
 Pigeon slates: Maynard, 13  
 Pikeville quadrangle: Hayes 95b; Phalen, 11  
 Polk Co.: Whitney, 53  
 Pyrite and pyrrhotite, Ducktown: Taylor (J H),  
 18  
 Road materials: Purdue, 14c  
 Roan Mountain quadrangle: Keith, 07b  
 Sequatchie Valley: Bowron, 86  
 Sevier Co.: Troost, 41  
 Sewanee quadrangle: Hayes, 94c  
 Shady Valley: Garrison, 04a  
 Slate: Dale, 06c; Pigeon slates: Maynard, 13  
 Spring Creek oil field: Munn, 12e  
 Standingstone quadrangle: Campbell (M R),  
 99  
 Tripoli deposit, Butler: Glenn, 14, 14b  
 Wartburg quadrangle: Keith, 97  
 Waynesboro quadrangle: Drake, 14  
 Zinc: Ashley, 10b; Clarke (W C), 07, 07a; Os-  
 good, 10; Purdue, 14d; Troost, 48; Wat-  
 son, 06a  
 Claiborne and Union cos.: Clarke (W C), 07a  
 eastern Tenn.: Clark (W C), 07; Keith, 04a  
 Nason, 15; Osgood, 09  
 northeastern Tenn.: Purdue, 12b



## Tennessee—Continued.

*Economic geology*—Continued.

Zinc: northern Tenn.: Purdue, 12c

Union Co.: Blake (W P), 60b; Nason, 15

*Historical geology*.

Appalachians, southern: Bradley, 75; Elliott (J B), 83

Asheville quadrangle: Keith, 04

Borings, Oneida, Scott Co.: Glenn (L C), 15a;

Warren Co.: Satterfield, 77

Briceville quadrangle: Keith, 96b

Bristol quadrangle: Campbell (M R), 99a

Bristol-Big Stone Gap section: Boyd (C R), 87

Camden chert: Safford, 99

Carboniferous, Appalachian basin: Stevenson, 04

Central basin: Purdue, 16a

Chartanooga quadrangle: Hayes, 94b

Chattanooga series: Ulrich, 12

Chester series: Ulrich, 17

Chilhowee Mountain: Keith, 92

Ellijay quadrangle: LaForge, 13

Cincinnati group, western Tenn.: Foerste, 03a

Cleveland quadrangle: Hayes, 95a

Cocke Co.: Troost, 40

Columbia quadrangle: Hayes, 03

Coosa Valley: McCalley, 97

Cranberry quadrangle: Keith, 03

Cretaceous and superior formations, western Tenn.: Safford, 64

Cumberland coal field: Lesley, 55

Cumberland Co., southern part: Butts, 16a

Cumberland Plateau: Duffield, 02; Killebrew, 76a

Devonian: Foerste, 01; western Tenn.: Dunbar, 18

Devonian and black shale succession, western Tenn.: Dunbar, 17a

Eastern Tenn.: Killebrew, 76c

Eocene: Berry, 16a

Estillville quadrangle: Campbell (M R), 94

General: Ashley, 10b; Christy, 48; Currey, 54, 56, 57; Hall, 52d; Killebrew, 74, 78; McWhirter, 85; Safford, 56, 58, 66, 69, 80, 87, 00; Troost, 35a, 40, 41, 43

Geologic map: Jenkins, 15; Safford, 56a, 74, 88, 96a; Sayler, 66; Tenn Agr Exp Sta, 96

Geologic formations, classification: Safford, 01

Geologic sections in southeastern Tenn.: Ulrich, 13e

Glenmary oil field: Glenn, 18b; Purdue, 17a

Greeneville quadrangle: Keith, 05

Harpeth Ridge, Davidson Co.: Loomis, 46

Highland Rim: Purdue, 17b

Holston marble formation, eastern Tenn.: Gordon (C H), 17

Jefferson Co.: Troost, 48

Johnson Co.: Jenkins, 16

Kingston quadrangle: Hayes, 94a

Knoxville quadrangle: Keith, 95

Lafayette formation: Berry, 11h

LaGrange: Safford, 92b

Linden and Clifton limestones: Foerste, 02a

Loudon quadrangle: Keith, 96

McMinnville quadrangle: Hayes, 95c

Maynardville quadrangle: Keith, 01

Memphis region: Munn, 12d; Safford, 90

## Tennessee—Continued.

*Historical geology*—Continued.

Middle Tenn.: Safford, 51, 87b, 96

Middleton formation: Safford, 92a, b

Midway stage: Harris, 96

Morristown quadrangle: Keith, 96a

Mount Mitchell quadrangle: Keith, 05a

Nashville region: Jones, 92; Troost, 43

Niagaran, western Tenn.: Pate, 08

Northern coal field: Glenn (L C), 16

Ocoee district: Troost, 37

Ordovician: Foerste, 01; Ulrich, 88a

eastern Tenn.: Safford, 59

middle Tenn.: Safford, 53

Perry Co.: Wade (B), 14

Phosphate horizons: Safford, 01a

Pikeville quadrangle: Hayes, 95b

Reelfoot Lake district: Purdue, 16b

Ringgold quadrangle: Hayes, 94

Ripley formation, McNairy Co.: Wade, 17

Roan Mountain quadrangle: Keith, 07b

Scott Co., Glenmary: Glenn (L C), 17

Sequatchie Valley: Bowron, 86

Sevier Co.: Troost, 41

Sewanee, Franklin Co.: Safford, 92c

Sewanee quadrangle: Hayes, 94c

Silurian: Foerste, 01; western Tenn.: Roemer, 60; Safford, 61

Silurian and Devonian limestone, western Tenn.: Foerste, 03b

Southeastern Tenn.: Hayes, 92

Southern coal field: Nelson (W A), 16

Standingstone quadrangle: Campbell (M R), 99

Stevenson quadrangle: Hayes, 95

Sweetwater district, eastern Tenn.: Gordon (C H), 18

Tertiary: Heilprin, 84a

Tracy City: Brown (C S), 92

Tuscaloosa formation: Wade, 17a; delta character: Berry, 17d

Wartburg quadrangle: Keith, 97

Washington Co.: Lesley, 72

Waverlyan period: Bassler, 11d

Waynesboro quadrangle: Drake, 14; Miser, 17a

Western Tenn.: Glenn, 06; Safford, 87a

*Mineralogy*.

General: Purdue, 13c; Troost, 38a

Ducktown minerals: Kemp, 98e; Van Horn, 14

Kraurite and cacoxene: Troost, 48b

Lorettoite, Loretto: Wells, 16a

Meteorite, Babbs Mill, Green Co.: Cohen, 91, 92

Campbell Co.: Smith (J L), 55

Carthage, Smith Co.: Kaemmerer, 13, 13a; Troost, 46

Carthage and Jackson Co.: Troost, 46

Charlotte: Troost, 45

Cocke Co.: Shepard, 42a

Cookeville, Putnam Co.: Merrill (G P), 16b

Cosby's Creek, Cocke Co.: Cohen, 92; Troost, 40a

Cleveland: Genth, 87a

Cumberland Mountains: Newberry, 87e

DeKalb Co.: Troost, 45

Dickson Co.: Smith (J L), 75a

Green Co.: Blake (W P), 86; Troost, 45

Jackson Co.: Troost, 46

Lincoln Co.: Smith (J L), 61a



## Tennessee—Continued.

*Mineralogy*—Continued.

- Meteorite, Long Creek, Jefferson Co.: Cohen, 92; Shepard, 54  
 Morristown, Hamblen Co.: Eakins, 93; Merrill (G P), 96d  
 Murfreesboro: Troost, 48a  
 Nashville: Seybert, 30  
 Petersburg: Shepard, 57  
 Powder Mill Creek, Cumberland Co.: Kunz, 87d, j  
 Robertson Co.: Smith (J L), 61a  
 Rockwood, Cumberland Co.: Howell, 87; Whitfield (J E), 87b  
 Smithville, De Kalb Co.: Glenn, 04b; Huntington, 94a  
 Tazewell, Claiborne Co.: Shepard, 54  
 Tazewell Co.: Smith (J L), 55  
 Waldron Ridge, Claiborne Co.: Kunz, 87d  
 Nashville region: Glenn, 04c  
 Pisanite, Ducktown: Van Horn, 13a  
 Psilomelanite: Wherry, 16a

*Paleontology*.

- Alloccrinus, Niagara group: Wachsmuth, 90a  
 Asaphus, Perry Co.: Troost, 38  
 Asterias antiqua, Davidson Co.: Troost, 35b  
 Asteracanthus, Glasgow: Leidy, 70e  
 Bird bones from caves: Shufeldt, 97  
 Brachiospongia: Troost, 38  
 Busycon cretaceum: Wade, 17c  
 Bythopora, Nashville: Miller (S A), 80d  
 Calceola, Silurian: Safford, 60a  
 Cambrian trilobites: Walcott, 10  
 Camden chert: Safford, 99  
 Chazy Gastropoda: Raymond (P E), 08  
 Cincinnati and Lexington fossils: Foerste, 10  
 Crinoidea: Miller (S A), 82b; Troost, 50; Hel-derbergian: Hall, 79a  
 Crustacea, Ordovician: Safford, 89b  
 Davidson Co.: Troost, 35c  
 Devonian, western Tenn.: Dunbar, 18  
 Eocene: Berry, 16a; flower: Berry, 13  
 Gastropoda, Cretaceous, McNairy Co.: Wade, 17d, e  
 General: Safford, 69; Troost, 40, 41  
 Mammalian remains, Memphis: Wyman, 50  
 Mastodon: Carpenter (W M), 46; Anon, 13; Knoxville: McCallie, 92  
 Megalonyx: Safford, 92  
 Big Bone cave, Tennessee: Mercer, 97  
 White Co., Tenn.: Harlan, 35c  
 Mississippian: Winchell (A), 69c  
 Nashville region: Troost, 43  
 Orthocerata, Nashville: Troost, 38  
 Ostracoda: Ulrich, 90f, 00  
 Paleozoic Invertebrata: Miller (S A), 93  
 Pentremites reinwardtii: Troost, 35a  
 Plantae, Cretaceous: Berry, 16f; Fayette Co.: Lesquereux, 59  
 Platytrochus speciosus: Vaughan, 02d  
 Rensselaerina, Linden shale: Dunbar, 17  
 Ripley fauna, McNairy Co.: Wade, 17  
 Silurian fossils: Foerste, 09b; western Tenn.: Roemer, 60  
 Spongida, Decatur: Roemer, 48c  
 Trapa, Henry Co.: Berry, 14c  
 Trenton, Bryozoa: Ulrich, 82

## Tennessee—Continued.

*Paleontology*—Continued.

- Troost's crinoids of Tennessee: Wood (Elvira), 09  
 Vertebrata, Memphis: Wyman, 50d  
*Petrology.*  
 Unakite: Bradley, 74a  
*Physical geology.*  
 Bays Mountain, eastern Tenn.: Willis, 87a  
 Caves: Bailey (T L), 18  
 Chattanooga quadrangle: Hayes, 94b  
 Cleveland quadrangle: Hayes, 95a  
 Earthquake, eastern Tenn.: Gordon (C H), 13b, 14  
 Erosion at Ducktown: Glenn, 06b  
 Fault, Embreeville Furnace, Washington Co.: Lesley, 72  
 Greeneville quadrangle: Keith, 05  
 Gullied lands, western Tenn.: Purdue, 13b  
 Hillside wash: Purdue, 14a  
 Jointing and veining, Cumberland Gap: Shaler, 95e  
 Knoxville quadrangle: Keith, 95  
 Maynardville quadrangle: Keith, 01  
 Monteagle cave, Grundy Co.: Nelson, 12b  
 Natural bridges, Cumberland Mountains: Nelson (W A), 15  
 Pikeville quadrangle: Hayes, 95b  
 Sandstone dikes, Eocene: Glenn, 04d  
 Sewanee quadrangle: Hayes, 94c  
 Stylolitic structure in marble, origin: Gordon (C H), 18a  
 Travertine falls and reefs, origin: Branner, 01a  
*Physiographic geology.*  
 Bays Mountain, eastern Tenn.: Willis, 87a  
 Central basin: Kennedy, 89  
 Chattanooga district: Hayes, 94b, 99e  
 Cleveland quadrangle: Hayes, 95a  
 Eastern Tenn.: White (C H), 04  
 General: Glenn (L C), 15; Hull, 91; Safford, 80, 84  
 Highland Rim: Purdue, 17b  
 Kingston quadrangle: Hayes, 94a  
 Middle Tenn.: Safford, 87b  
 Peneplains, eastern Tenn.: Dodge (R E), 96  
 Plains: Glenn, 14a  
 Standingstone quadrangle: Campbell (M R), 99  
 Sewanee quadrangle: Hayes, 94c  
 Tennessee River, Tertiary history: Johnson (D W), 05

*Underground water.*

- General: Glenn, 04, 05a  
 Memphis region: Safford, 90  
 Mineral springs: Safford, 85a  
 Sewanee, Franklin Co.: Safford, 92c  
 Sulphur and chalybeate waters: Safford, 89a  
 West of Tennessee River: Glenn, 06

- Tennessean epoch: McGee, 96a  
 Tepee buttes: Gilbert, 95a  
 Tephrocyon: Merriam (J C), 13c  
 Teratornis: Miller (L H), 09a  
 Terlingua, Tex., mercury minerals: Hillebrand, 07a, 09  
 Terlingua quicksilver district, Tex.: Phillips, 05b, 06; Turner (H W), 06  
 Terminology, new terms in geology: Branner, 97d



**Terraces.** *See also* Beaches; Shore lines.

- Aggraded terraces, Rio Grande: Keyes, 07b  
 Alaska, Controller Bay region: Martin (G C), 08; Yukon district: Spurr, 98a  
 Appalachian rivers: White (I C), 87  
 Arkona beaches: Taylor (F B), 05a  
 Bajada belts: Keyes, 17a  
 British Columbia: Begbie, 71  
 California: Wittich (E), 12  
   Diablo Range: Anderson (F M), 08  
   Klamath region: Hershey, 03d  
   northern coast: Lawson, 94  
   Orleans Basin: Hershey, 04a  
   Point Reyes Peninsula: Anderson (F M), 99  
   San Clemente Island: Smith (W S T), 98  
   Sierra Nevada: Gilbert, 05d  
   southern coast: Lawson, 93a  
   southern islands: Smith (W S T), 00  
   Yolo Co., Cache Creek area: Durst, 16  
 Canada: Bell (R), 61; Hind, 64  
 Classes: Hitchcock (E), 51b  
 Climatic theory: Huntington, 14  
 Colorado, southwestern: Spencer (A C), 00b  
 Connecticut: Gulliver, 07a  
   Brewsters Neck: Gulliver, 06  
   eastern: Koons, 82  
   southeastern: Hatch, 17  
   Thames River: Gulliver, 60, 11  
 Connecticut Valley: Dana (J D), 81a, 82, 83b;  
   Fairchild, 14a; Hitchcock (E), 50, 51b,  
   52a, 57; Webber, 44  
 Cuba: Hill (R T), 95b; Cape Maisi: Hershey, 98a  
 Delaware River: Winchell (N H), 14b  
 Development: Dodge (R E), 94  
 Formation: Wright (G F), 11b  
 General: Dana (J D), 49a; Fairchild, 18; Gilbert,  
   80, 85; Moody (A E), 07; Powell, 83a;  
   Anon, 73  
 Georgia, Coastal Plain: Veatch (J O), 11a  
 Hudson-Champlain valley: Fairchild, 14a  
 Ice present during formation of glacial terraces:  
   Gulliver, 07a  
 Idaho, northern: Hershey, 12  
 Illinois, Danville region: Wegemann, 09  
   Galena and Elizabeth quadrangles: Trow-  
   bridge, 16  
   Illinois Valley: Barrows, 08  
   northwestern: Carman, 09  
 Indiana, lower Wabash: Scovell, 99  
   Tippecanoe Co., Wabash River: McBeth, 02  
   Wabash Valley: Dryer, 13  
   Whitewater River: Hole, 12  
 Iowa, Des Moines Valley: Lees, 16; Tilton, 15a,  
   16  
   eastern: Carman, 09  
   Fayette Co.: Finch (G E), 01  
 Lake Bonneville: Gilbert, 90  
 Lake Erie basin: Fairchild, 07  
 Lake Superior region: Agassiz (L), 49a; Kina-  
   han (G H), 87  
 Maryland, Coastal Plain: Davis (W M), 07a;  
 Shattuck, 07a; Cumberland: Abbe, 98  
 Massachusetts, Mount Toby: Emerson (B K),  
   11; Westfield River: Davis (W M), 02a  
 Mexico, Lower California: Wittich (E), 09, 12  
 Michigan: Cooper (W F), 07; Grand River:  
   Mudge, 99

**Terraces—Continued.**

- Minnesota, Saint Anthony Falls: Sardeson, 08  
 Mississippi, northern and central, Pliocene:  
   Shaw (E W), 18  
 Mississippi Valley: Chamberlin (T C), 91  
 Missouri: Todd, 96a  
 Missouri River: Todd, 89b  
 Monongahela River: White (I C), 96  
 Natural and artificial: Peet, 91  
 Nevada, Lahontan Basin: Russell, 85  
 New Brunswick: Goldthwaite, 12  
 New England: Dana (J D), 57; Spencer (J W),  
   95e; high-level terraces: Spencer (J W),  
   08b; river terraces: Davis (W M), 01c, 02  
 New Hampshire: Atherton, 95, 97; Connecticut  
   Valley: Upham, 77  
 New Jersey, southern: Coman, 91  
 New York: Desor, 50j; Woodworth, 07a  
   Finger Lake region: Watson, 99  
   Horseheads outlet of glacial lakes, central  
   N. Y.: Fuller, 03g  
   Hudson River valley: Merrill (F J H), 91a;  
   Ries, 91b  
   Mohawk Valley: Spencer (J W), 13; Taylor  
   (F B), 92  
 New York and New Jersey: Merrill (F J H),  
   90a  
 North Carolina, Coastal Plain: Johnson (B L),  
   07  
 North Dakota, Tower quadrangle: Willard,  
   06g  
 Ohio: Leverett, 91; Wright (G F), 83  
   Cuyahoga Co.: Newberry, 73a  
   Holmesville: Cole (G G), 18  
   Lake Erie: Desor, 50h; Whittlesey, 50  
   rock terraces near Columbus: Hubbard  
   (G D), 03d  
   southeastern: Hubbard (G D), 08  
   southern: Andrews (E B), 60  
 Ohio River: King (A T), 54; Wright (G F),  
   90, 96d; upper: White (I C), 84  
 Ontario: Chapman (E J), 61; Roy, 37  
   Lake Ontario, western end: Spencer (J W),  
   82a  
   Nottawasaga Valley: Fleming, 53  
   shore lines between Georgian Bay and the  
   Ottawa Bay: Hunter, 08  
 Origin: Rogers (H D), 50e; in glaciated regions:  
   Tarr, 92e  
 Pennsylvania: Lesley, 78c  
   Harrisburg: Bashore, 94  
   southwestern: Stevenson, 78b, 80  
   western: Chamberlin (T C), 94e; Hice, 95;  
   Leverett, 91; Shaw (E W), 11, 11j  
 Quebec: Goldthwait, 12; lower St. Lawrence:  
   Goldthwait, 11a; Taylor (F B), 11  
 River terraces: Dana (J D), 71d  
 South Dakota: Todd, 10  
 Texas: Hill (R J), 98b; Colorado River: Tarr,  
   92e  
 Vermont: Johnson (D W), 07d  
   Connecticut Valley: Hitchcock (C H), 03b;  
   Hitchcock (E), 61  
   Green Mountains: Goldthwait, 16a  
   northwestern: Merwin, 08  
   Ripton: Hungerford, 68b  
   West River: Fisher (E F), 06



**Terraces—Continued.**

- Washington, Columbia River: Russell, 98b;  
Okanogan Valley: Keyes, 17h
- West Virginia, Marshall, Wetzel, and Tyler  
cos.: Hennen, 09
- Wisconsin, Driftless Area, rock terraces: Mar-  
tin (L), 17  
eastern: Goldthwait, 06, 07  
Mississippi River: Martin (L), 18
- Terrestrial gravity and earth movements: Spencer  
(J W), 13b
- Terry lignite field, Mont.: Herald, 12
- Tertiary.** *See also* Paleontology, Tertiary.
- Alabama: Aldrich, 85; Hager, 18; Hale (C S),  
48; Hilgard, 67; Langdon, 86, 91a; Lyell,  
47c; Smith (E A), 86, 87, 92b, 94d, 05a,  
06a; Thornton, 58; Tuomey, 50, 58; Win-  
chell (A), 57
- Claiborne: Lyell, 47c; Mell, 80
- Clarke Co., Eocene: Heilprin, 81
- Coastal Plain: Smith (E A), 94
- Cretaceous-Eocene contact: Smith (E A), 10a  
eastern: Langdon, 94
- Eocene: Lyell, 46
- Hatchetigbee anticline: Hopkins (O B), 17b
- Jackson and Vicksburg deposits: Cooke (C  
W), 18a
- Midway formation: Aldrich, 94a
- Miocene: Johnson (L C), 93a
- Mobile Co.: Stelle, 88
- St. Stephens limestone overlap: Smith (E A),  
06b  
white limestone, age: Casey, 01
- Alaska: Brooks (A H), 00a, 02, 07; Dall, 82, 96;  
Eichwald, 71
- Alaska Peninsula: Atwood, 11
- Bering River field: Fisher (C A), 14
- Bonnifield region: Capps, 12
- Broad Pass region: Moffit, 15
- Cantwell formation: Pogue, 15a
- Chandalar-Koyukuk region: Maddren, 13;  
Schrader, 00b
- Chisana-White River district: Capps, 16
- Circle quadrangle: Prindle, 13b
- Controller Bay region: Martin (G C), 08
- Cook Inlet region: Paige, 07
- Copper River region: Mendenhall, 05
- Fairbanks quadrangle: Prindle, 13
- Fort Hamlin to Kotzebue Sound: Menden-  
hall, 02
- Fortymile quadrangle: Prindle, 09
- Gulkana-Susitna region: Moffit, 12
- Iliamna and Clark lakes region: Martin (G  
C), 10a
- Iliamna region: Martin (G C), 12a
- Innoko district: Maddren, 10
- Kachemak Bay region: Stone (R W), 06
- Kantishna region: Capps, 17
- Kenai Peninsula: Martin (G C), 15
- Kotsina-Chitina region: Moffit, 09b
- Matanuska and Talkeetna basins: Paige, 07b
- Matanuska coal field: Martin (G C), 06b
- Matanuska Valley: Martin (G C), 12b
- Mount McKinley region: Brooks (A H), 11
- Nabesna-White River district: Moffit, 10a
- Nelchina-Susitna region: Chapin, 18
- Noatak-Kobuk region: Smith (P S), 13a

**Tertiary—Continued.**

- Alaska: northern: Kindle, 07b; Schrader, 04
- Porcupine River: Kindle, 08a
- Rampart region: Eakin, 13; Prindle, 06b
- Rocky Mountains: Schrader, 02
- southeastern: Wright (F E), 08
- southwestern: Spurr, 00
- Turnagain Arm region: Moffit, 06
- upper Yukon region: Brooks (A H), 08a
- Willow Creek district: Capps, 15b
- Yakataga district: Maddren, 14
- Yakutat Bay region: Tarr (R S), 09a
- Yentna district: Capps, 12a, 13
- Yukon district: Spurr, 98a
- Yukon-Koyukuk region: Eakin, 16
- Yukon-Tanana region: Prindle, 05
- Alberta: Malcolm, 13
- Edmonton field: Dowling, 10a
- northern: Slipper, 16
- North Saskatchewan River, country south of  
Tyrrell, 87
- Sheep River district: Dowling, 14a, c  
southwestern: Stewart (J S), 16
- Alum Bluff formation: Berry, 16b
- Amyzon beds: Cope, 79j
- Antigua: Brown (A P), 14; Guppy, 11
- Antilles: Spencer (J W), 01c; Vaughan, 15d
- Apalachicola fauna, Lower California: Arnold,  
17b
- Appalachians: Keith, 94a
- Appomattox formation: McGee, 88a, 90, 91i
- Arctic regions: Dawson, 87a; Feilden, 78; Heer,  
79a; McMillan, 10
- Ellesmere and Grinnell lands: Hortedahl, 17
- Miocene: De Rance, 75
- Arizona, Clifton-Morenci district: Lindgren, 05a
- Fort Apache region: Reagan, 03b
- Globe quadrangle: Ransome, 04a
- Grand Canyon district: Dutton, 82, 82a
- Navajo country: Gregory (H E), 17
- northern: Darton, 10a
- plateau district: Robinson (H H), 07
- Salt River valley: Lee (W T), 05
- Santa Rita and Patagonia mountains: Schra-  
der, 15
- southeastern: Dumble, 02
- western: Lee (W T), 08a
- Arkansas: Hill (R T), 92f; Veatch (A C), 06e
- Arkansas River: Warder, 54
- Camden coal field: Taff, 00a
- Crowleys Ridge: Call, 90, 91
- eastern: Call, 91a
- northeastern: Call, 94; Stephenson, 16a
- Red River region: Hill (R T), 94
- southern: Harris, 94
- southwestern: Hill (R T), 88
- Astoria series, Mount Diablo region, Cal.:  
Clarke (B L), 17
- Atlantic Coastal Plain: Conrad, 35, 35b, 42b;  
Darton, 95a; Heilprin, 83d; McGee, 91b;  
Vanuxem, 29a
- Cape Fear River region: Clark (W B), 90b
- Eocene fauna: Clark (W B), 95g
- post-Eocene Tertiary: Heilprin, 82b
- Atlantic slope: Clark (W B), 96a
- Barbados: Craig, 18; Ellis, 07a, 11; Franks, 98;  
Guppy, 11; Harrison (J B), 90, 02, 07



## Tertiary--Continued.

- Base-leveling, Minnesota and Manitoba: Upham, 94m
- Bermuda Islands: Bullen, 11; Verrill, 07
- Brandon lignite: Hitchcock (E), 61
- Bridger beds: Osborn, 97b; age: Cope, 74l
- British Columbia: Dawson (G M), 81b; Dowling, 15a
- Atlin district: Cairnes, 13
- Beaverdell area: Reinecke, 15
- Boundary district: LeRoy, 12, 13a
- Cariboo district: Bowman, 88
- Coast range: Camsell, 13a
- Crowsnest and Flathead areas: Rose, 18
- Finlay and Omenica rivers: McConnell, 96
- Flathead area: MacKenzie, 16a
- Franklin mining camp, West Kootenay Drysdale, 15
- Fraser River valley: Bowen (N L), 14
- Golden-Kamloops: Daly (R A), 15
- Graham Island: Clapp (C H), 14a; Ells, 06b; MacKenzie, 14a, 16b
- Groundhog coal field: Malloch, 14
- Horsefly, Similkameen, and Tranquille beds: Lambe, 06a
- International boundary region: Daly (R A), 03b
- Kamloops area: Dawson (G M), 95
- Lillooet-Chilko Lake: Bateman, 14
- New Westminster and Nanaimo districts: LeRoy, 08
- Queen Charlotte Island: Dawson (G M), 80
- Rocky Mountains: Dawson (G M), 95e
- Roseland: Bruce, 17a; Drysdale, 15a
- Savona area: Rose, 14
- Skeena River district: Leach, 10
- southern interior: Dawson (G M), 79
- southwestern: Tyrrell, 15a
- Telkwa River district: Dolmage, 17
- Thompson River valley: Drysdale, 14
- Tulameen district: Camsell, 10, 13
- Vancouver area: Burwash, 18
- Vancouver Island: Clapp (C H), 12, 13b, e; Hall (C W), 06; Haycock, 03
- Cooke and Duncan areas: Clapp (C H), 17
- northern part: Dawson (G M), 87
- southern part: Clapp (C H), 14b
- West Kootenay: Drysdale, 12
- West Kootenay and Boundary districts: LeRoy, 13
- Ymir area, West Kootenay district: Drysdale, 17
- California: Antisell, 56; Arnold, 03, 06, 09b; Blake (W P), 55, 57; Cooper (J G), 74d; Marcou, 83; Smith (J P), 10, 16; Stanton, 96, 96b
- Alleghany district: Ferguson (H G), 14a
- auriferous gravels: Turner, 95a
- Berkeley Hills: Lawson, 02
- Bidwell Bar quadrangle: Turner, 98
- Big Trees quadrangle: Turner, 98a
- Cahuilla Basin: Free, 14a
- Cantua-Panoche region: Anderson (R), 11
- Carmelo Bay: Lawson, 93d
- Carrizo Creek beds: Dickerson, 18
- Chanac formation: Merriam (J C), 16c
- Coalinga district: Arnold, 08g, 09a, 10

## Tertiary--Continued.

- California: Coalinga oil field region: Dumble, 12; Nomland, 16a; Pack, 14b; Etchegoin
- Pliocene: Nomland, 17c
- Coast Ranges: Fairbanks, 94d, 95a; Lawson, 95a; Osmont, 05; Turner, 94d, 98b; southern: Anderson (F M), 04; Fairbanks, 98
- Colfax quadrangle: Lindgren, 00
- Colorado Desert: Kew, 14
- Contra Costa hills, Oligocene: Clark (B L), 15a
- Cuyama Valley: English, 16
- Death Valley and Mohave Desert: Campbell (M R), 02b
- Diablo Range: Anderson (F M), 05, 08; Turner, 91
- Downieville quadrangle: Turner, 97
- eastern: Ball (S H), 07; Fairbanks, 96c; Spurr, 03
- Eocene: Arnold, 14a; Waring (C A), 14; Martinez group: Dickerson, 14a
- Fernando group: English, 14
- Humboldt Co.: Stalder, 15; Eel River valley: Harmon, 15
- Inyo Range: Knopf, 18
- Ione formation: Dickerson, 14g
- Jackson quadrangle: Turner, 94
- Kirker Pass Neocene section: Clark (B L), 12
- Klamath Mountains: Anderson (F M), 02a; Diller, 03d
- Klamath region: Hershey, 02d
- Lassen Peak district: Diller, 89, 95
- McKittrick district: Gester, 17
- McKittrick-Sunset district: Arnold, 10a; Johnson (H R), 09
- Martinez formation: Waring (C A), 17
- Marysville quadrangle: Lindgren, 95
- Marysville Buttes region: Dickerson, 13, 17e
- middle and northern, Pliocene: Martin (B), 16
- Miocene: Cooper (J G), 74b; Smith (J P), 12b
- Mohave Desert region: Baker (C L), 11; Merriam (J C), 13h, 15g; Pack, 14a
- Mohawk Valley: Turner, 91a
- Monterey: Blake (W P), 55e
- Monterey series: Louderback, 13; Martin (B), 12
- Mother Lode district: Ransome, 00
- Neocene deposits, Kern River: Anderson (F M), 11
- Nevada City area: Lindgren, 96
- North Coalinga region: Merriam (J C), 15b
- northern: Diller, 93
- northern coast: Lawson, 94
- Placerville quadrangle: Lindgren, 94
- Pliocene: Nomland, 17a; Jacalitos Creek: Nomland, 16b
- Pliocene history: Cooper (J G), 74a
- Point Reyes Peninsula: Anderson (F M), 99
- Pyramid Peak quadrangle: Lindgren, 96a
- quicksilver districts: Becker, 88
- Redding quadrangle: Diller, 06
- Rock Creek area: Dickerson, 14c
- Sacramento quadrangle: Lindgren, 94a
- Salinas Valley: English, 18; Nutter, 01
- Salt Lake oil field: Arnold, 06c
- San Clemente Island: Smith (W S T), 98
- San Diego Co., Carrizo Mountain: Mendenhall, 10



## Tertiary—Continued.

California: San Francisco district: Blake (W P), 56e; Lawson, 14  
 San Francisco Peninsula: Crandall (R), 07a; Lawson, 95  
 San Joaquin Valley: Anderson (R), 12, 15  
 San Juan district: Anderson (F M), 14  
 San Lorenzo series: Clark (B L), 18b  
 San Luis Obispo Co.: Antisell, 55  
 San Luis quadrangle: Fairbanks, 04  
 San Pablo formation: Weaver, 08, 09  
 San Pedro: Arnold, 03  
 Santa Ana Mountains: Dickerson, 14b  
 Santa Barbara Co., Point Sal: Fairbanks, 96a  
 Santa Clara Valley (southern Cal.): Eldridge, 07  
 Santa Cruz Mountains: Arnold, 08d; Ashley, 95; Miocene diabase: Haehl, 04; Neocene: Ashley, 96  
 Santa Cruz quadrangle: Branner, 09  
 Santa Margarita beds: Nomland, 17b  
 Santa Maria district: Arnold, 07d, f  
 Sargent oil field: Jones (W F), 11  
 Sierra Nevada: Lindgren, 96c, 11; Turner, 94a, c, 96; Whitney, 80  
 Smartsville quadrangle: Lindgren, 95a  
 Sonora quadrangle: Turner, 97a  
 southern: Hershey, 02b; Keyes, 09f; Marcou, 76; Pliocene: Arnold (D), 02; correlation: Merriam (J C), 15h  
 southern coast: Lawson, 93e  
 Summerland district: Arnold, 07e  
 Taylorville region: Diller, 92, 08b  
 Tehachapi region: Buwalda, 16  
 Tejon group: Dickerson, 14, 15, 16  
 Temblor Basin: Anderson (F M), 14  
 Calvert formation: Berry, 16c  
 Canada: Ami, 00a, 01h; Dowling, 09; Selwyn, 84  
 forty-ninth parallel: Dawson (G M), 75  
 Rocky Mountain region: Dawson (G M), 01  
 western: Hector, 61  
 Canal Zone: MacDonald (D F), 16a  
 Cannonball member of Lance formation: Lloyd, 14a  
 Caribbean region: Guppy, 09  
 Carrizo Creek beds, California: Arnold, 04  
 Catahoula sandstone: Matson, 16a  
 Catoctin belt: Keith, 94a  
 Central America, northern: Sapper, 99  
 Citronelle formation: Matson, 16  
 Classification: Heilprin, 87c  
 Coastal Plain formations: Clark (W B), 09a  
 Maryland and Virginia: Darton, 91b  
 North Carolina: Miller (B L), 12d  
 Coastal region, Gulf of Mexico: Kennedy, 17  
 Colorado: Lesquereux, 74b; Ziegler, 18b  
 Apishapa quadrangle: Stose, 12  
 Arkansas Valley: Darton, 06f  
 Book Cliffs field: Richardson (G B), 07a, 09b  
 Castle Rock quadrangle: Richardson (G B), 15  
 central: Peale, 76  
 Colorado Springs quadrangle: Finlay (G I), 16  
 Creede district: Emmons (W H), 13d  
 Cripple Creek district: Cross, 95  
 De Beque field: Woodruff, 13a  
 Denver formation: Cross, 89  
 Denver region: Cannon, 95b; Cross, 89a; Eldridge, 89; Emmons (S F), 96

## Tertiary—Continued.

Colorado: Durango-Gallup field: Shaler (M K), 07b  
 Engineer Mountain quadrangle: Cross, 10  
 Florissant, Miocene: Cockerell, 12; Henderson, 06; Knowlton, 16b; Scudder, 81; Wheeler (W M), 06, 08  
 Gilpin Co.: Bastin, 16  
 Grand Mesa and West Elk Mountains: Lee (W T), 12a  
 Grand Mesa coal field: Lee (W T), 09  
 Grand River district: Peale, 78  
 Hahns Peak region, Routt Co.: George (R D), 09b  
 Huerfano beds: Hills, 90a  
 Huerfano Lake basin: Osborn, 97, 97b, 1  
 Huerfano River: Hills, 89a  
 Lake City district: Cross, 11; Irving, 11a  
 Monument Creek formation: Darton, 05i  
 Monument Creek group: Richardson (G B), 12  
 Needle Mountains quadrangle: Cross, 05b  
 Nepesta quadrangle: Fisher (C A), 06a  
 North Park: Beckly, 15  
 northwestern: Gale, 07a, 09, 10; White (C A), 78d, 89; Winchester, 16a; Woodruff, 14b  
 Ouray quadrangle: Cross, 07a  
 post-Laramie deposits: Cross, 92  
 Pueblo quadrangle: Gilbert, 97  
 Rabbit Ears region: Grout, 13a  
 Rangely district: Gale, 08b  
 Raton Mesa region: Knowlton, 13; Lee (W T), 17  
 Rocky Mountains: Hills, 91c  
 Routt Co.: Fenneman, 06b  
 San Luis district: Endlich, 74  
 San Luis Valley: Siebenthal, 10, 10a  
 Silverton quadrangle: Cross, 05  
 southern: Endlich, 77; Gardner (J H), 09a  
 Stevenson, 81  
 Spanish Peaks quadrangle: Hills, 01  
 Trinidad coal field: Richardson (G B), 10  
 Walsenburg quadrangle: Hills, 00  
 White River district: Endlich, 78  
 Colorado plateau: Newberry, 76  
 Continental outlines in Tertiary time: Matthew (W D), 06a  
 Coral reefs: Vaughan, 02h  
 Cordilleran region: King (C), 78a; Lindgren, 15a; Matthew (W D), 00, 15; Ransome, 15; forty-ninth parallel: Daly (R A), 13  
 Correlation: Dall, 09a; Hilgard, 87a; Osborn, 18; Vaughan, 18c  
 American and European: Osborn, 01d  
 Cenozoic: Osborn, 10a  
 Pacific region and Great Basin: Merriam (J C), 14b  
 Correlation and paleogeography: Osborn, 12g  
 Costa Rica: Romanes, 12  
 Peninsula of Nicoya: Romanes, 12a  
 Talamanca region: MacDonald (D F), 14; Miller (B L), 14  
 Cretaceous-Eocene, Rocky Mountain front and Great Plain provinces: Ashley, 15a  
 Cretaceous-Eocene boundary: Cross, 96b  
 Cretaceous-Eocene contact, Atlantic and Gulf Coastal Plain: Stephenson, 14b, 15



## Tertiary—Continued.

- Cretaceous-Tertiary boundary: Brown (B), 14; Matthew (W D), 14; Osborn, 14; Stanton, 14; Rocky Mountain region: Knowlton, 14a
- Cuba: De Golyer, 18; Hill (R T), 94a; Spencer (J W), 95a; Habana y Guanabacoa: Salterain y Legarra, 80
- Dakota: Hayden, 69b
- Delaware: Booth, 41; Chester (F D), 84, 84a; Dover quadrangle: Miller (B L), 06
- District of Columbia: McGee, 86, 91c
- Eastern North America: Meyer (O), 88b
- Eastern States: Finch (J), 23
- Eocene: Clark (W B), 91, 93b; Conrad, 46a, 47; Hilgard, 85a; Matthew (W D), 14e; Meyer (O), 85; Smith (E A), 85b
- Atlantic Coastal Plain: Clark (W B), 95d; Lyell, 45b
- Big Horn Basin: Sardeson, 01e
- correlation: Dickerson, 18a
- southeastern North America: Berry, 16a
- west of 100th meridian: Smith (J H), 00
- Eocene deposits, geographic conditions: Harris 18
- Eocene formations, Rocky Mountains, petrographic characters: Johannsen, 14a
- Eocene lacustrine formations: Scott (W B), 88b
- Eocene lignite formation: Conrad, 65
- Erosion intervals: Miller (B L), 09; in Eocene of Mississippi embayment: Berry, 15
- Eruptive rocks, classification: Szabó, 79
- Esmeralda formation, Nevada: Turner, 00d
- Florida: Cox (E T), 9b; Dall, 87, 90, 15; Foerste, 93a; Heilprin, 87a; Johnson (L C), 88a, 93; Matson, 09a, b, 13a; Sellards, 13b, 16; Smith (E A), 81a, 06a; Tuomey, 51
- Alachua clays: Sellards, 14a
- eastern: Sellards, 10b
- Key West: Hovey, 96
- Miocene: Dall, 85b; Langdon, 89
- northern: Foerste, 94
- Ocala Limestone: Cooke (C W), 15
- Peace Creek beds: Dall, 91
- phosphate districts: Matson, 15
- southern: Sanford, 09; Sellards, 15
- Tallahassee region: Sellards, 17a
- Tampa: Kerr, 85a
- Walton Co., Choctawhatchee marl: Mansfield (W C), 16
- western: Dall, 94; Sellards, 18a,c
- Fort Union formation: Weed, 96e; correlated beds: Knowlton, 09
- Franklin: Low, 06
- Fresh-water Tertiary of West, classification: Matthew (W D), 00
- General: Agassiz (L), 63h; Branner, 97b; Cope, 74, 84, 87c; Dall, 98, 09a; Gardner (J S), 84; Hall, 57a; Heilprin, 85c; Hilgard, 85a,b; Lesquereux, 82a,b; Marcou, 85b; Matthew (W D), 15; Meyer (O), 85, 85a; Miller (S A), 81; Osborn, 00h, i, 10, 10a; Smith (E A), 85b, 88a; Taylor (F B), 10
- Georgia: Berry, 14; Foerste, 93a; McCallie, 10; Veatch (J O), 09
- Altamaha formation: Veatch (J O), 08
- Bainbridge: Vaughan, 00e

## Tertiary—Continued.

- Georgia: central, Eocene: Harris, 02
- Claiborne and Jackson deposits: Cooke (C W), 18
- Coastal Plain: Brantley, 16; Shearer, 17; Stephenson, 15a; Veatch (J O), 11a
- Eocene: Harris, 96b; Lyell, 46
- Flint River, Oligocene: Dall, 16
- Miocene horizons: Vaughan, 10a
- southwestern: Dall, 94; Foerste, 94; Pumphelly, 93; Spencer (J W), 91a
- Grand Gulf formation: Dall, 92a, 02b, 03; Hilgard, 03; Johnson (L C), 89, 92a; Smith (E A), 02a
- Great Basin: Cope, 81g
- Great Plains: Darton, 03c, 05; Englemann, 76; Hay (R), 92a; White (C A), 82; northern: Hayden, 62
- Greenland: Böggild, 17; Nordenskjöld, 09
- Cape Dalton: Ravn, 03
- Disco region: Brown (R), 75
- eastern: Toula, 74
- Miocene: Brown (R), 68
- northeastern: Nathorst, 01
- west coast: White (D), 98a
- western: Heim, 11b
- Green River formation, Colorado, Utah, and Wyoming: Winchester, 16a
- Guadeloupe: Spencer (J W), 01a
- Guatemala: Sapper, 94b
- Gulf Coast formations: Matteson, 18
- Gulf Coastal Plain: Dall, 94; Hayes, 03a; Hilgard, 71a, 81
- Haiti: Jones (W F), 18; Tippenhauer, 09
- Hawaii, Oahu: Dall, 00
- Hell Creek and Ceratops beds: Knowlton, 09
- Huerfano beds: Hills, 89a, 90a, 95
- Idaho: Eldridge, 95
- Boise region: Jones (E L), 16a; Lindgren, 98, 98a
- Custer Co.: Umpleby, 13b
- Goose Creek district, Cassia Co.: Bowen (C F), 13a
- Horseshoe Bend and Jerusalem Valley. Bowen (C F), 13
- Lemhi Co.: Umpleby, 13
- Nampa quadrangle: Lindgren, 04
- northern: Hershey, 12
- phosphate reserve: Richards (R W), 11b
- Silver City quadrangle: Lindgren, 04a
- Snake River plains: Russell, 02a
- southeastern: Richards (R W), 14a; Schultz, 13, 18
- southwestern: Russell, 03
- western central: Lindgren, 00a
- Idaho-Wyoming border: Breger, 10
- Illinois: Purdy, 07; Weller, 06a; Worthen, 66
- Peoria quadrangle: Udden, 12
- southern: Shaw (E W), 17c
- Interior: Cope, 88a
- Iowa: Keyes, 13p
- Fort Dodge: Keyes, 15j
- Riverside sands: Keyes, 13l
- Jackson stage, Louisiana: Casey, 02
- Jamaica: Duncan, 65; Hill (R T), 99; Sawkins, 69; Clarendon district: Duncan, 65
- John Day beds: Merriam (J C), 00a, 03b



## Tertiary—Continued.

Judith River formation: Peale, 12  
 Kansas: Hay (R), 93a; Moore (R C), 17; Mudge, 75b, 76, 77, 78; St. John, 83c  
   central: Perrine, 18  
   Fort Riley Reservation: Hay (R), 96  
   Harper Co.: Cragin, 85a  
   Logan and Gove cos.: Adams (G I), 98a  
   Loup Fork: Cragin, 91a; Sternberg, 06  
   Neocene terranes: Cragin, 96c  
   northwestern: Hay (R), 89d  
   Norton Co.: Hay (R), 85  
   Seward Co.: Adams (G I), 02b  
   southwestern: Case, 94; Haworth, 97; Hay (R), 90; St. John, 87  
   western Pliocene: Mudge, 75  
 Kentucky: Glenn, 06  
   Blue Grass region: Matson, 09  
   Eocene: Heilprin, 86a  
   Franklin Co.: Miller (A M), 14  
   Shawneetown quadrangle: Lee (W), 16  
   western: Loughridge, 88  
 Lacustrine formations of West: Scott (W B), 94c, 95h  
 Lafayette formation: Hilgard, 92a; Shaw (E W), 18; Alabama: Johnson (L C), 94  
 Lafayette gravel: Shaw (E W), 18b  
 Lance formation: Knowlton, 11a, e  
 Land connection between Asia and North America: Knopf, 10a; between North and South America: Scharff, 09, 09a  
 Laramie, age: Bannister, 79; Cope, 90c; Gardner (J S), 80; Schimper, 79; Stevenson, 90b; Ward (L F), 90; stratigraphic position: Cope, 78t  
 Laramie group: Newberry, 89b; relations: White (C A), 88b  
 Lignite beds, age: Cope, 74i; Stevenson, 75c  
 Lignitic formation: Lesquereux, 76c, 78  
 Lignitic group: Hayden, 74a, 76, 76a  
 Lignitic stage: Harris, 97  
 Louisiana: Dumble, 02d; Fenneman, 06a; Harris, 99a, 02a, 09; Hilgard, 69, 69b, 73; Hopkins (F V), 70, 71, 72; Matson, 17; Veatch (A C), 06e, g  
   Caddo oil and gas field: Matson, 16b  
   De Soto-Red River field: Matson, 17a  
   eastern: Clendenin, 96  
   Lafayette beds: Harris, 08a; McGee, 08a  
   Natchitoches area: Harris, 99b  
   New Orleans boring: Hilgard, 70a  
   northern: Lerch, 92, 93; Veatch (A C), 02, 05a  
   northwestern: Harris, 09b; Vaughan, 95, 96  
   Ouachita region: Veatch (A C), 02b  
   Sabine River region: Veatch (A C), 02a  
   Shreveport area: Veatch (A C), 99  
   southern: Harris, 04a, 05  
   southwestern: Clendenin, 96  
   Winnfield sheet: Harris (G D), 07  
 Loup Fork beds, Gila River: Cope, 84m  
 Loup Fork formation, New Mexico: Cope, 84c  
 Loup Fork group: Sternberg, 82  
 Maine, Portland: Hitchcock (E), 36b  
 Manitoba, southwestern: Dawson (G M), 74  
 Martinez Eocene time, climatic zones: Dickerson, 17b  
 Martinique: Giraud, 18; Guppy, 13

## Tertiary—Continued.

Maryland: Clark (W B), 97b, 06c; Darton, 94g; Heilprin, 80a; Ries, 02a; Shattuck, 06a; Uhler, 88a, 89, 90  
 Anne Arundel Co.: Little, 17  
 Baltimore area: Darton, 92a  
 Calvert Cliffs: Harris, 93a  
 Calvert Co.: Shattuck, 07  
 Cecil Co.: Shattuck, 02  
 Choptank quadrangle: Miller (B L), 12  
 Coastal Plain: Shattuck, 98  
 Dover quadrangle: Miller, (B L), 06  
 Eocene: Clark (W B), 01; Harris, 94a; Heilprin, 81d  
 Fredericksburg quadrangle: Darton, 94d  
 Miocene: Shattuck, 02a  
 Nomini quadrangle: Darton, 96a  
 Patuxent quadrangle: Shattuck, 07c  
 Potomac River section: Clark (W B), 93  
 Prince Georges Co.: Miller (B L), 11  
 St. Marys Co.: Shattuck, 07a  
 St. Marys quadrangle: Shattuck, 06a  
 southern: Clark (W B), 88a, 90, 91b  
 Tolchester quadrangle: Miller (B L), 17  
 Washington quadrangles: Darton, 01  
 Massachusetts: Emerson (B K), 17; Hitchcock (E), 41  
 Chappaquiddick Island: Brown (T C), 05  
   eastern: Shaler, 90b  
   Marthas Vineyard: Lyell, 43a; Shaler, 88; Woodworth, 97  
   Nantucket Island: Desor, 49  
   Winthrop Head: Dodge (W W), 88  
 Meganos group, Eocene, California: Clark (B L), 18  
 Mexican boundary: Hall, 57a  
 Mexico: Spencer (J W), 97  
   Chiapas and Tabasco: Böse, 05; Sapper, 94c, 96a  
   Coahuila: Aguilera, 09c; Haarman, 13  
   coastal area: Dumble, 15c  
   Durango: Angermann, 07, 07a  
   eastern: De Golyer, 15b; Dumble, 12a, 15a  
   Furbero field: De Golyer, 15a  
   Guerrero, Chilpancingo: Ordóñez, 99b; Iguala-San Miguel Totolapa: Hall (C E), 03  
   Hidalgo: Bárcena, 77b; Tulancingo: Galvez, 16; Villarello, 02  
   Isthmus of Tehuantepec: Barroso, 77  
   Ixmiquilpan Valley, Hidalgo: Paredes, 09b  
   Jalisco: Bárcena, 91  
   Lower California: Heim, 15, 16; Wittich, 09  
   northeastern: Dumble, 08, 11b, 15b; Garfias, 15; White (I C), 13; Tuxpam beds, age: Dumble, 16  
   oil fields: Huntley, 15  
   Plateau region: Wittich, 15a  
   Sonora: Dumble, 00a  
   Cananea district: Lee (M L), 12  
   Moctezuma region: Aguilera, 88  
   Tampico embayment area: Dumble, 18  
   Tehuantepec: Böse, 10c  
   Tuxpam: Dickerson, 17d  
   Yucatan: Sapper, 96  
 Middleton formation: Safford, 92a  
 Midway stage: Harris, 96



## Tertiary—Continued.

- Miocene, Astoria and Coos Bay, Oreg.: Dall, 09b  
 Atlantic Coastal Plain: Dall, 94b; Lyell, 45a  
 Maryland: Clark (W B), 04, 04a  
 Miocene boulders, fossiliferous, Block Island: Shimer, 16  
 Miocene correlation, Atlantic coast: Olsson, 14a  
 Mississippi: Brown (C S), 07; Crider, 06, 06b, 07; Harper, 57; Hilgard, 60, 67, 86; Langdon, 86; Lieber, 54; Logan, 05a; Lowe, 15; Lyell, 47c; Meyer (O), 86a; Smith (E A), 06a; Wailes, 54  
 Jackson and Vicksburg deposits: Cooke (C W), 18a  
 Meridian: Berry, 17  
 Natchez: Gale, 47  
 Newton and Wautubbee: Meyer (O), 86c  
 northern: Mabry, 98  
 Oktibbeha Co.: Logan, 04a  
 Vicksburg: Conrad, 52, 66g  
 Vicksburg-Jackson area: Hopkins (O B), 16  
 Walnut Hills, Eocene: Conrad, 46d  
 Warren Co.: Conrad, 46c  
 Mississippi River: Little, 83  
 Missouri: Swallow, 58  
 Joplin district: Smith (W S T), 07a  
 Ozark region: Crane (G W), 12; Park, 04  
 St. Louis quadrangle: Fenneman, 11  
 Winoka gravels: Hays, 04; Park, 04  
 Missouri River region: Hayden, 57, 58, 66b; Meek, 57, 61d  
 Montana: Peale, 86a; Stebinger, 13a  
 Bearpaw Mountains: Pepperberg, 10  
 Big Horn Mountains: Darton, 06e  
 Big Sandy field: Bowen (C F), 14b  
 Birch Creek-Sun River region: Stebinger, 18  
 Blackfeet Indian Reservation: Stebinger, 17a  
 Boulder batholith: Billingsley, 15  
 Bull Mountain coal field: Lupton, 11; Woolsey, 09  
 Butte district: Weed, 97  
 Camp Baker: Grinnell, 76  
 Carbon Co.: Darton, 07a  
 central: Bowen (C F), 15  
 Crazy Mountains: Stone (R W), 09  
 Culbertson field, Valley Co.: Beekly, 12  
 Custer National Forest: Wegemann, 09a  
 Dillon quadrangle: Winchell (A N), 14  
 eastern: Calvert, 12; Leonard, 11; Rowe, 16  
 Elkhorn Mountains: Stone (R W), 11  
 Garnet Range: Pardee, 18  
 Great Falls region: Fisher (C A), 09  
 Helena region: Knopf, 13  
 high gravels, age: Collier, 17a  
 Judith River region: Hayden, 59a  
 Lake Basin field: Hancock, 17  
 Lewis and Livingston ranges: Willis, 02  
 Little Sheep Mountain field: Rogers (G S), 13  
 Livingston formation: Stone (R W), 10  
 Livingston quadrangle: Iddings, 94  
 Marysville district: Barrell, 07  
 Miles City coal field: Collier, 09a  
 Milk River coal field: Pepperberg, 09a, 12  
 Musselshell Valley: Bowen (C F), 18e  
 Neocene lake beds: Douglass, 99  
 northeastern: Collier, 18, 18a

## Tertiary—Continued.

- Montana: Philipsburg quadrangle: Calkins, 15  
 Pine Ridge field: Rogers (G S), 14  
 Red Lodge coal field: Woodruff, 09a  
 Sentinel Butte lignite field: Leonard, 09  
 Sheridan Co.: Bauer, 14a  
 south central: Douglass, 02a  
 southwestern: Pardee, 13a  
 Stillwater basin: Calvert, 16  
 Sweetgrass Co.: Douglass, 09a  
 Terry lignite field, Custer Co.: Herald, 12  
 Teton Co.: Stebinger, 16  
 Three Forks region: Haynes, 16a; Peale, 96  
 Murfreesboro stage of Miocene, Atlantic Coastal Plain: Olsson, 17  
 Nebraska: Aughey, 80; Barbour, 03; Hayden, 58, 59, 62, 67, 69b; Hicks, 88b; Peterson, 06e; Russell (F W), 92  
 Camp Clarke quadrangle: Darton, 03  
 Elk Point quadrangle: Todd, 08  
 northeastern: Condra, 08  
 northwestern: Hatcher, 94; Osborn, 08c  
 Pliocene: Matthew (W D), 09e  
 Republican River valley: Condra, 07  
 Scotts Bluff quadrangle: Darton, 03a  
 Sioux Co.: Cook (H J), 15a; Pliocene: Sinclair, 15  
 western: Darton, 99a, f, 03b; Peterson, 09  
 Nevada: Reid (J A), 08d; Spurr, 03  
 Antelope district: Schrader, 13  
 Big Smoky Valley: Meinzer, 17  
 Bullfrog district: Ransome, 10c  
 Carson area: Reid (J A), 11  
 Cedar Mountain region: Merriam (J C), 16  
 Elko Co.: Schrader, 12  
 Esmeralda Co.: Turner, 02  
 Esmeralda formation: Turner, 00, 00d  
 Goldfield district: Ransome, 09, 10a  
 National district: Lindgren, 15  
 northeastern: Emmons (W H), 10  
 northern: Hershey, 12  
 Osino, Eocene: Cope, 72u  
 Reese River basin: Waring (G A), 18  
 Reno region: Anderson (R), 09a  
 Silver Peak quadrangle: Spurr, 06b; Turner, 09  
 Tonapah district: Spurr, 05  
 Truckee region: Louderback, 08  
 Virgin Valley region: Merriam, 10b, 11a  
 Walker River region: Smith (D T), 04  
 west central: Buwalda, 14b  
 Yerington district: Knopf, 18a; Ransome, 09c  
 Neocene: Dall, 92  
 Newfoundland, Grand Bank: Verrill, 78  
 New Jersey: Clark (W B), 93a, 94; Conrad, 69; Cook (G H), 68, 83, 84, 85a; Kummel, 04, 09, 11b; Lewis (J V), 15; Rogers (H D), 36  
 Atlantic City: Woolman, 90  
 Bordentown quadrangle: Shattuck, 95  
 Cumberland Co., Miocene: Hellprin, 87b  
 Miocene: Clark (W B), 95e, f  
 Philadelphia district: Bascom, 09a  
 Shark River deposits: Harris, 16  
 southern: Salisbury, 95e  
 Trenton quadrangle: Bascom, 09b  
 New Mexico: Cope, 74d, 75c, 77; Herrick, 98c; Keyes, 07d; Lindgren, 10



## Tertiary—Continued.

New Mexico: Albuquerque region: Bryan, 09; Herrick, 00b  
 Carthage coal field: Gardner (J H), 10a  
 Cerrillos Hills: Johnson (D W), 03  
 Deming quadrangle: Darton, 17  
 Durango-Gallup field: Shaler (M K), 07b  
 Eocene: Granger, 14  
 Gallina-Raton Spring coal field: Gardner (J H), 09  
 Jemez-Albuquerque region: Reagan, 03  
 Jornada del Muerto: Keyes, 05  
 Lake Valley district: Keyes, 08  
 Luna Co.: Darton, 16  
 Navajo country: Gregory (H E), 17  
 north central: Lee (W T), 12b  
 northern: Gardner (J H), 09a; Stevenson, 81  
 northwestern: Darton, 10a  
 plateau district: Robinson (H H), 07  
 Puerco and Torrejon formation: Gardner (J H), 10e  
 Raton Mesa region: Knowlton, 13, 17; Lee (W T), 17  
 Rio Grande region: Henderson (J), 13  
 San Juan Basin, Paleocene deposits: Sinclair, 14a  
 San Juan Co.: Bauer, 16  
 San Mateo-Cuba district: Gardner (J H), 10b  
 Silver City quadrangle: Paige, 16  
 Socorro and Valencia cos.: Herrick, 00a  
 Tularosa Basin: Meinzer, 15  
 New York, Long Island: Crosby, 00a; Edwards (A M), 95; Veatch (A C), 06c, d  
 Tertiary drainage: Fairchild, 10d  
 Nicaragua, Canal route: Hayes, 99, 99a; northeastern: Hershey, 12a  
 Niobrara River region: Leidy, 59h  
 North America: Willis, 12  
 North Carolina: Clark (W B), 12; Conrad, 67, 71a; Kerr, 75; Miller (B L), 10, 12d  
 Eocene: Kerr, 85, 85b  
 erosion intervals: Miller (B L), 10  
 Orange Co., Pliocene: Smith (J E), 17b  
 Wilmington: Stanton, 91  
 North Dakota: Hayden, 62; Leonard, 04a, 06d, 13, 17  
 Bismarck quadrangle: Leonard, 12  
 Cannonball River lignite field: Lloyd, 14  
 Fort Berthold Indian Reservation: Pishel, 12  
 Killdeer Mountains: Quirke, 18  
 Nesson anticline, Williams Co.: Collier, 18b  
 Sentinel Butte lignite field: Leonard, 09  
 Sentinel Butte region: White (C A), 83n  
 south-central: Leonard, 12b  
 Standing Rock Indian Reservation: Calvert, 14  
 western: Leonard, 11; Lloyd, 15  
 Williston lignite field: Herald, 13  
 Northwest Territory: Meek, 67  
 Oahu: Hitchcock (C H), 15  
 Ocala limestone, age: Cooke (C W), 16  
 Oklahoma: Berry, 18a; Gould, 02, 05  
 Colgate quadrangle: Taff, 01  
 Grandfield district: Munn, 14  
 north-central: Bloesch, 17a  
 Red River region: Hill (R T), 94  
 Oligocene: Dall, 16b; Pacific coast: Clark (B L), 18a; southern United States: Maury, 02

## Tertiary—Continued.

Oligocene and Miocene deposits of Great Plains, origin: Hatcher, 02d  
 Orange sand, age: Chamberlin (T C), 91; Salisbury, 91  
 Orbitoides beds: Douvillé, 18  
 Oregon: Arnold, 09b; McCornack, 06  
 Baker district: Grant (U S), 14  
 Blue Mountains: Lindgren, 01  
 Bohemia region: Diller, 00  
 Cascades: Smith (W D), 17  
 central: Russell, 05  
 Clarno dam site: Williams (I A), 16b  
 Columbia River basin: Collier, 16; Williams (I A), 16a  
 Coos Bay region: Dall, 09b; Diller, 01, 11c  
 Curry Co.: Butler (G M), 16  
 Dayville reservoir sites: Collier, 16a  
 Eden Ridge field: Leshner, 14  
 Eocene: Arnold, 14a  
 John Day Basin: Calkins, 02; Collier, 14; McClung, 06; Merriam (J C), 01a, 07  
 Klamath Mountains: Anderson (F M), 02a  
 Miocene, Astoria and Coos Bay: Dall, 09b  
 northwestern: Diller, 96; Washburne, 14  
 Pliocene, Snake River valley: Cope, 83y  
 Port Orford quadrangle: Diller, 03  
 southern: Diller, 93  
 southeastern: Russell, 03  
 southwestern: Diller, 14a; Winchell (A N), 14a  
 Sumpter quadrangle: Pardee, 14  
 Origin of western deposits: Sardeson, 01e  
 Ozarkian epoch: McGee, 96a  
 Paleogeographic map: Willis, 09  
 Paleogeography: Ihering, 11  
 Panama: Hayes, 11c; Hershey, 01d; Howe, 07, 07a, 08; Joukowsky, 06  
 Panama Canal Zone: Bertrand, 06; Douvillé, 91, 98a; MacDonald (D F), 13f, 15  
 Panama straits, ancient: Dickerson, 17c  
 Post-Laramie deposits, Colorado: Cross, 92  
 Potomac River section, Eocene: Clark (W B), 96  
 Pre-Pleistocene gravels, Mississippi basin: Salisbury, 92b  
 Puerco and Laramie deposits, relations: Cope, 85u  
 Puget group, Washington: Willis, 97  
 Porto Rico: Berkey, 15a; Reeds, 16, 16a  
 Coamo-Guayama region: Hodge (E T), 17  
 San Juan district: Semmes, 17  
 Rocky Mountain fresh-water formations: Davis (W M), 00a  
 Rocky Mountain region: Davis (W M), 00; Engelmann, 76; Hayden, 61, 68c; Lesquereux, 73b, 74e; Marsh, 75; Meek, 74c  
 St. Croix: Quin, 07  
 San Pablo group, California: Clark (B L), 15  
 Santa Fe marls: Cope, 74m  
 Santo Domingo: Gabb, 73; Heneken, 53; Moore (J C), 50; Maury, 17, 18  
 Saskatchewan: Dawson (G M), 74  
 Cypress Hills: Weston, 93  
 Cypress Hills and Wood Mountain region: McConnell, 85  
 southern: Davis (N B), 18; Dawson (G M), 81  
 Wood Mountain-Willowbunch area: Rose, 16



## Tertiary—Continued.

Shark River Eocene deposits, age: Harris, 16  
 Shell Bluff group: Hilgard, 66a  
 South Carolina: Berry, 14; Conrad, 67; Pugh, 05; Rogers (G S), 14a; Ruffin, 43; Sloan, 04, 07, 08; Smith (J L), 44; Tuomey, 48, 49  
 Ashley district: Dall, 94a; Holmes (F S), 50a  
 Charleston: Holmes (F S), 49; Stephenson, 14a; Vogdes, 78a  
 Coastal Plain: Darton, 96f  
 Pliocene: Tuomey, 57  
 South Dakota: Darton, 09a; Hayden, 58, 62; Todd, 95, 10  
 Black Hills: Carpenter (F R), 88; Darton, 01a, 09, 18; Newton, 80; O'Harra, 10  
 Cheyenne River Indian Reservation: Calvert, 14  
 Edgemont quadrangle: Darton, 04a  
 northwestern: Winchester, 16  
 Oelrichs quadrangle: Darton, 02a  
 south central: Perisho, 12  
 southeastern: Todd, 00  
 Standing Rock Indian Reservation: Calvert, 14  
 western: Lloyd, 15  
 White River region: Hayden, 57a  
 Southeastern United States: Lyell, 42c  
 Southern States: Conrad, 34; Heilprin, 81a; Lyell, 46e; Vaughan, 00a  
 Subdivisions: Agassiz (L), 63  
 Table of formations: Dall, 93  
 Tejon, age: Heilprin, 82d; Eocene age: Harris, 93b  
 Tennessean epoch: McGee, 96a  
 Tennessee: Glenn, 06; Safford, 56, 69; western: Nelson (W A), 11; Safford, 64  
 Tertiary lake basins of West: Marsh, 75  
 Texas: Buckley, 74; Dumble, 90, 94, 95b, 02d, 09, 15, 15a; Harris, 09; Penhallow, 07c; Roemer, 48; Udden, 16a  
 Austin quadrangle: Hill (R T), 02  
 Brazos Co.: Kennedy, 93  
 Carrizo sands: Dumble, 11a  
 Coastal Plain: Deussen, 14; Dumble, 15c; Fenneman, 06a  
 Corsicana field: Matson, 17b  
 Dallas region: Matson, 16c  
 eastern: Kennedy, 92  
 Eocene beds: Dumble, 11; Heilprin, 86a; east of Brazos River: Kennedy, 95a  
 Galveston well: Harris, 93  
 Grimes Co.: Kennedy, 93  
 Gulf region: Penrose, 90  
 Harrison Co., Port Caddo Landing: Vaughan, 95a  
 Houston Co.: Kennedy, 92a  
 Kaufman Co.-Sabine Pass: Kennedy, 92b  
 Lasalle and McMullen cos.: Deussen, 16  
 Llano Estacado: Cummins, 92a: northern: Baker (C L), 15  
 northeastern: Burchard, 15; Gordon (C H), 11; Stephenson, 18  
 northwestern: Cummins, 91, 93; fresh-water  
 Tertiary: Gidley, 03b  
 Nueces quadrangle: Hill (R T), 98a  
 Palestine salt dome: Hopkins (O B), 17  
 Panhandle: Gould, 06, 07

## Tertiary—Continued.

Texas: Red River region: Hill (R T), 94  
 Rio Grande region: Hill (R T), 98b; Vaughan, 00b  
 Robertson Co.: Kennedy, 93  
 Saratoga: Dumble, 06  
 southwestern: Dumble, 03  
 Uvalde quadrangle: Vaughan, 00  
 western: Hill (R T), 91f  
 Titanotherium beds: Hatcher, 93a  
 Tobago: Craig, 07; Miocene: Guppy, 03  
 Trinidad: Douvillé, 17; Ells, 07a, 11; Guppy, 64, 65, 92; Harrison (J B), 99; Wall, 60; Caroni series, Savaneta: Guppy, 12b; Polycystina beds: Guppy, 90  
 Tuxpam beds, age: Dumble, 16  
 Uinta Basin: Scott (W B), 99  
 Uinta formation: Douglass, 14; Riggs, 12  
 United States, eastern: Rogers (H D), 35; eastern and southern: Heilprin, 84, 84a  
 Utah: Engelmann (H), 58a; Meek, 73  
 Book Cliffs region: Richardson (G B), 09b  
 Brown's Park beds: Irving, 96  
 Canyon Range: Loughlin, 14  
 Castle Valley: Lupton, 16a  
 central: Robinson (H M), 16  
 Coalville field: Wegemann, 15  
 eastern: Umpleby, 12a  
 Eocene: Conrad, 71  
 high plateaus: Dutton, 80  
 Manti beds: Cope, 80g  
 Morgan Co., Lost Creek field: Clark (F R), 18a  
 northeastern: Gale, 09, 10; White (C A), 89; Winchester, 16a; Woodruff, 14b  
 Sanpete and Sevier valleys: Richardson (G B), 07  
 southern: Leith, 08a  
 Uinta Mountains: Marsh, 71; Powell, 76; Weeks, 07  
 Uintah Co., Deep Creek district: Lupton, 12  
 Wasatch Co., Blacktail Mountain coal field: Lupton, 12a  
 Wasatch Mountains: Loughlin, 13  
 Vermont, Hitchcock (E), 61  
 Brandon: Dale, 04b; Hitchcock (E), 53a, d; Perkins (G H), 04c, 05a; Woodworth, 04  
 Green Mountain region: Perkins (G H), 12  
 Vicksburg beds, age: Casey, 01  
 Virginia: Darton, 94g; Lyell, 42c; Miller (B L), 09; Rogers (H D), 37, 39a; Rogers (W B), 36, 40, 41, 59a, 81, 84a  
 Coastal Plain: Clark (W B), 06d, 12b; Sanford, 13  
 eastern: Clark (W B), 90  
 Eocene: Harris, 94a  
 erosion intervals: Miller (B L), 10  
 Fredericksburg quadrangle: Darton, 94d  
 James River valley: Olsson, 14  
 Lafayette formation: Darton, 92b  
 Nomini quadrangle: Darton, 96a  
 Norfolk quadrangle: Darton, 02  
 Potomac River section: Clark (W B), 96  
 St. Marys quadrangle: Shattuck, 06a  
 Wasatch group: Hayden, 78f  
 Washington: Arnold, 09b; Landes, 02a  
 Blewett district: Weaver, 11



## Tertiary—Continued.

- Washington: Cascade Mountains: Russell, 00;  
Smith (G O), 04b, c  
central: Russell, 93a; Smith (G O), 03a  
Chehalis sandstone: Lawson, 94b  
Cowlitz River, Oligocene: Dickerson, 17a  
Cowlitz Valley, Eocene: Weaver, 15c, 16b  
eastern: Hershey, 12  
Ellensburg quadrangle: Smith (G O), 03  
King Co.: Evans (G W), 12  
Kittitas Co.: Saunders, 14  
Kitsap Co., Oligocene: Weaver, 16d  
Mount Stuart quadrangle: Smith (G O), 04  
Oligocene: Van Winkle, 18  
Olympic Peninsula: Arnold, 06a; Reagan, 09d; Weaver, 07  
Oroville-Nighthawk mining district: Umpleby, 11a  
Pierce Co.: Daniels, 14  
Quincy Valley: Schwennesen, 18a  
Republic district: Umpleby, 10  
Skykomish basin: Smith (W S), 15, 16  
Snoqualmie quadrangle: Smith (G O), 06b  
south central: Waring (G A), 13  
southeastern: Russell, 97b  
southwestern: Weaver, 12a  
Tacoma quadrangle: Willis, 99  
Tejon group: Dickerson, 15  
• western: Jones (W F), 14; Weaver, 12a, 16, 16a; post-Eocene formations: Weaver, 16c  
White Bluffs region: Merriam (J C), 17  
Yakima Co.; Smith (G O), 01  
Western States: Cope, 82n; Osborn, 09; Scott (W B), 95h; lacustrine formations: Scott (W B), 94c  
West Indies: Gregory (J W), 95; Guppy, 66c, 67, 12; Lorié, 89; Miocene: Duncan, 64; northeastern: Cleve, 71, 82  
White River beds: Wortman, 93  
White River formation, origin: Matthew (W D), 99  
White River region: Leidy, 59h  
White River Oligocene, mode of deposition: Fraas, 01  
Wind River beds: Osborn, 97b  
Wyoming: Darton, 08; Hayden, 62, 68, 68b, 69c; Knight (W C), 00; Leidy, 72k; Meek, 60a; Osborn, 81; Peterson, 06c  
Absaroka quadrangle: Hague, 99b  
Aladdin quadrangle: Darton 05b  
Bald Mountain and Dayton quadrangles: Darton, 06c  
Barber coal field, Johnson Co.: Wegemann, 13  
Bear River beds: Hayden, 70a  
Big Horn Basin: Fisher (C A), 06; Hewett, 17; Lupton, 16; Sinclair, 11a, 12b; Washburne, 09; Woodruff, 09a, 10  
Big Horn Mountains: Darton, 06e  
Big Muddy dome: Barnett, 14b  
Black Hills region: Darton, 09  
Bridger Basin: Matthew (W D), 09  
Bridger beds: Sinclair, 06a  
Buffalo coal field: Gale, 10d  
Carbon Co.: Veatch (A C), 07a  
central: Hares, 15, 16  
Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
Converse Co., Ceratops beds: Hatcher, 93

## Tertiary—Continued.

- Wyoming: Devils Tower quadrangle: Darton, 07b  
Douglas oil field, Converse Co.: Barnett, 14; Jamison, 12  
Eocene: Granger, 14  
Fremont Co.: Jamison, 11a  
Glenrock coal field: Shaw (E W), 09  
Great Divide Basin coal field: Smith (E E), 00  
Green River district: Davis (W M), 03h; Peale, 79; Winchester, 16a  
Hanna Basin: Bowen (C F), 18  
Hartville quadrangle: Smith (W S T), 03  
Lander oil field: Woodruff, 11  
Laramie and Sherman quadrangles: Darton, 10c  
Laramie Basin: Darton, 09f  
Laramie Mountains: Darton, 16a  
Lincoln Co.: Schultz, 14  
Little Powder River field: Davis (J A), 12  
Little Snake River coal field: Ball (M W), 09, 10  
Lost Spring coal field: Winchester, 12  
Muddy Creek oil field, Carbon Co.: Jamison, 12  
North Laramie Mountains: Spencer (A C), 10  
northwestern: Eldridge, 94a; Sinclair, 11  
Park Co.: Moody, 18  
Patrick and Goshen Hole quadrangles: Adams (G I), 02  
Powder River basin: Wegemann, 17  
Salt Creek oil field: Wegemann, 11, 18  
Salt River Range: Mansfield, 16a  
Shoshone River section: Hewett, 14b  
southern: White (C A), 89  
Sundance quadrangle: Darton, 05a  
Sussex coal field: Wegemann, 12a  
Sweetwater Co.: Schultz, 09; Rock Springs coal field: Schultz, 10  
Sweetwater district: Endlich, 79  
Uinta Co.: Schultz, 07b; Veatch (A C), 06f  
Wasatch deposits: Loomis, 07a  
Washakie Basin: McMaster, 81  
Washakie formation: Granger, 09; Sinclair, 09  
western: Blackwelder, 15; Comstock, 74; Schultz, 18  
Wind River Basin: Granger, 10; Sinclair, 11a; Woodruff, 12c; Ziegler, 16  
Wind River Range: Endlich, 79  
Wyoming-Idaho border: Breger, 10  
Yellowstone and Missouri rivers: Hayden, 69a  
Yellowstone National Park: Hague, 99; Holmes (W H), 79; Weed, 96  
Yucatan: Heilprin, 91b; Sapper, 96a  
Yukon, Lewes and Nordenskiöld rivers district: Cairnes, 10a  
upper White River district: Cairnes, 15  
Wheaton River district: Cairnes, 10, 11a, 12, 14d  
Testudinata. *See* Reptilia.  
Tetrabelodon: Cope, 93c  
Tetracaulodon: Koch, 42  
Tetrahedral plan of earth: Emerson, 00  
Tetraplasy: Osborn, 12f  
Texada Island, B. C.: LeRoy, 06, 07; McConnell 09a, 14  
Texas.  
Bibliography: Simonds, 00



## Texas—Continued.

- Burnet Co.: Walker (J B), 89  
 Central mineral region: Comstock, 91  
 Central Texas: Comstock, 90; Cummins, 90; Taff, 92  
 Colorado coal field: Thompson (R A), 93  
 Concho country: Lerch, 91  
 El Paso: Richardson (G B), 08c  
 El Paso quadrangle: Richardson (G B), 09  
 Franklin Mountains: Richardson (G B), 06c  
 General: Boll, 79; Bollaert, 51; Dumble, 98; Hill (R T), 88e; Marcy, 50; Moore (F jr), 40; Roemer, 49  
 Geological mapping: Udden, 16  
 Geological survey: Comstock, 90a; Rössler, 75 progress: Shumard (B F), 60f reports: Buckley, 66, 74, 76; Dumble, 89, 90, 91a, 92, 92a, 93; Shumard (B F), 59; Stiles, 16  
 Grimes Co.: G., 89  
 Gypsum Hills: Gould, 01d  
 Hardeman Co.: W., 89  
 Hardin Co., Sour Lake region: Rössler, 76b  
 Hemphill Co.: Eyerly, 07  
 Jefferson Co.: Kennedy, 94  
 Llano Estacado: Ruffner, 77  
 Mexican boundary: Marcou, 67b  
 Mineral survey report: Phillips (W B), 04  
 Northwestern Texas: Loew, 73  
 Rio Grande, lower: Schott, 57; upper: Tilden, 47  
 Rio Grande region: Newberry, 83c; Parry, 57  
 Rio Grande valley, El Paso to Pecos River: Parry, 57a  
 Soil geology: Loughridge, 84b  
 Soils: Dumble, 95c  
 Southwestern Tex.: Bosworth, 13  
 Travis Co.: Hill (R T), 85  
 Trinity region: Riddell, 39  
 Undulations in clay deposits: D., 84  
 Volcanic ash: Udden, 13  
 Western Texas: Shumard (G G), 86
- Economic geology.*  
 Anderson Co.: Dumble, 91c  
 Asphalt: Dumble, 89a; Harper, 02; Phillips (W B), 02a, 04a; western Tex.: Vaughan, 97a  
 Austin quadrangle: Hill (R T), 02  
 Bat guano caves: Phillips (W B), 01c  
 Brazos Co.: Kennedy, 93  
 Brenham salt dome, Washington and Austin cos.: Hopkins (O B), 17a  
 Building stone, eastern Tex.: Penrose, 89a; Llano and Burnet quadrangles: Paige, 12  
 Caddo oil and gas field: Matson, 16b  
 Celestite deposits: Hess, 09b  
 Cement materials: Eckel, 13; Taff, 05b; El Paso: Richardson (G B), 08c  
 Clay: Deussen, 11; Kennedy, 93a; Ries, 06a, 08; dolomitic: Ries, 17a; El Paso: Richardson, 08c  
 Coal: Buckley, 74; Phillips (W B), 02a, 04a, 11a, 13; Ries, 05a; Streeruwitz, 88; Taff, 02a; Weitzel, 90  
 Brazos field: Ashburner, 81c  
 central field: Cummins, 90  
 Chisos country: Udden, 07a

## Texas—Continued.

*Economic geology*—Continued.

- Colorado field: Drake, 93, 17  
 Colorado River: Tarr, 90  
 Cretaceous, Rio Grande region: White (C A), 87  
 northern Tex.: Cummins, 89  
 Rio Grande valley: Owen (J), 88; Schmitz, 85; Vaughan, 00b  
 San Carlos field: Vaughan, 00b  
 Trinity region: Riddell, 39  
 Webb Co.: Ashley, 18a; Miller (B L), 13a  
 Coals and lignites, composition: Phillips (W B), 11a  
 Copper: Rössler, 69  
 Archer Co.: Genth, 68  
 Llano-Burnet region: Paige, 11  
 Permian ores: Phillips (A H), 11; Schmitz, 97  
 "Red Beds": Richard, 15  
 northern Tex.: Furman, 81  
 Cretaceous area: Hill (R T), 90  
 Dallas Co.: Shuler, 18  
 Dome theory: Lucas (A F), 12a  
 Eastern Texas: Kennedy, 92; Penrose, 89  
 El Paso Co.: Cummins, 88  
 El Paso quadrangle: Richardson (G B), 09  
 Fayette Co.: Melcher, 88  
 Feldspar deposits: Bastin, 10  
 Franklin Mountain tin prospects: Chauvenet, 10  
 Fuels: Phillips, 13  
 General: Blake (W P), 56; Boll, 80; Buckley, 66, 74, 76; Burleson, 74; Comstock, 90a; Dumble, 90, 91a, 92, 92a, 16a; Moore (F jr), 40; Rössler, 76a; Shumard (B F), 59, 60f; Udden, 16a  
 Gold, Eocene deposits: Dumble, 12b  
 Llano-Burnet region: Paige, 11, 12g  
 Williamson Co.: Schaeffer, 83  
 Glass Mountains: Udden, 17  
 Grahamite: Dumble, 93a  
 Granite: Burchard, 10b; Nash, 17; Llano-Burnet region: Paige, 11  
 Graphite, Llano-Burnet region: Paige, 11, 12  
 Grimes Co.: Kennedy, 93  
 Guadalupe Mountains: Tarr, 92  
 Gulf Tertiary: Penrose, 90  
 Gypsum: Cummins, 92; Hill (B F), 04  
 Houston Co.: Dumble, 91c; Kennedy, 92a  
 Humble oil field, Harris Co.: Deussen, 17  
 Iron: Buckley, 74; Linton, 13  
 central Tex.: Comstock, 91  
 eastern Tex.: Dumble, 88b, 91b, c, 01c; Johnson (L C), 88; Kennedy, 91, 95; Penrose, 89, 90; Walker (J B), 91; age Kennedy, 94a  
 northeastern Tex.: Burchard, 15; Eckel, 05d; Llano Co.: Paige, 10; Phillips (W B), 09b  
 Llano-Burnet region: Paige, 11, 12  
 Smith Co.: Herndon, 91  
 Tertiary: Penrose, 92a  
 Lead, Burnet Co.: Phillips (W B), 04c; Llano-Burnet region: Paige 11, 12.  
 Lignite: Dumble, 91, 92b; Phillips (W B), 02a, 11a, 13; Streeruwitz, 88a  
 Limestone: Eckel, 13; El Paso: Richardson (G B), 08c  
 Llano and Burnet quadrangles: Paige, 12



## Texas—Continued.

*Economic geology—Continued.*

Llano Estacado and westward: Cummins, 92a  
 Manganese: Harder, 10; Shumla: Roberts (J R), 18  
 Mineral resources: Buckley, 66a, 68; Parker (W B), 56; Phillips (W B), 10, 14  
 Mounds of oil fields: Hager, 04  
 Natural gas, Corsicana field: Matson, 17b  
 Mexia-Groesbeck field: Matson, 16c  
 northern Tex.: Nicholson, 14; Shaw (E W), 16a  
 Palo Pinto Co.: Wegemann, 15e  
 San Antonio: Tait, 89a  
 Wichita and Clay cos.: Udden, 12b, d  
 Nonmetallic mineral resources: Streeruwitz, 92c  
 Northern Tex.: Cummins, 89  
 Northwestern Tex.: Cummins, 91, 92, 93  
 Nueces quadrangle: Hill (R T), 98a  
 Oil fields, Gulf Coastal Plain: Fenneman, 06a; north central Tex.: Hager, 18a  
 Oil pools, Gulf Coast country: Matteson, 18  
 Oil possibilities, Wise Co.: Böse, 17  
 Ozokerite, Thrall oil fields: Schoch, 16  
 Palestine salt dome, Anderson Co.: Hopkins (O B), 17  
 Palo Pinto: Pepperberg, 15  
 Permian: Cummins, 90a  
 Petroleum: Adams (G I), 01a; Deussen, 18; Dumble, 97, 01b, 15a; Fenneman, 06a; Gardner (J H), 15a, 17; Harris, 01; Hill (R T), 01a, 02b; Hornaday, 12; Lucas (A F), 12; Mabery, 01; Phillips (W B), 01; Thiele, 01; Vicaire, 05; Willey, 04  
 Beaumont field: Dumble, 01d; Hill (R T), 02b; Lucas (A F), 02; Phillips (W B), 01a; Richardson (C), 01  
 Brenham salt dome: Hopkins (O B), 17a  
 coast region: Deussen, 18; Fenneman, 05a, d; Hayes, 03a, h  
 Corsicana field: Matson, 17b; Miller (T D), 98  
 Humble field: Deussen, 17  
 Nacogdoches field: Dumble, 88  
 north central Tex.: Kempher, 18  
 northern Tex.: Nicholson, 14  
 Petrolia gas and oil field: Shaw (E W), 16a  
 Saratoga: Dumble, 06  
 southeastern Tex.: Fishback, 02  
 Spring Creek field: Munn, 12e  
 Toyah field, Reeves Co.: Dinsmore, 10a; Wallace (H V), 11a  
 Thrall field: Udden, 15e, 16b  
 trans-Pecos fields: Phillips (W B), 02; Wallace (H V), 11c  
 Wichita and Clay cos.: Udden, 12b, d  
 Petroliferous mounds, origin: Chautard, 15  
 Potash: Phillips (W B), 15  
 Permian rocks: Udden, 12c, 15a  
 Spur, Dickens Co.: Udden, 14a  
 Precious metals: Streeruwitz, 92b  
 Quicksilver: Blake (W P), 96a; Demaret, 04; Dennis, 07  
 anticlinal theory: Udden, 18a  
 structural relations: Udden, 11  
 Terlingua district, Brewster Co.: Dinsmore, 09b; Hill (B F), 02; Hill (R T), 02e; Hornaday, 10; Kirk, 04, 05; Phillips (W B), 02, 04b, d, e, 05, 05b, 06, 09a, 17a; Spalding, 01; Turner (H W), 00e, 05, 06; Udden, 07a, 11, 17b

## Texas—Continued.

*Economic geology—Continued.*

Rare-earth minerals, Baringer Hill, Llano Co.: Hess, 08e  
 Rio Grande region: Schmitz, 85  
 Road materials: Hill (R T), 89b; Nash, 15; Black Prairie region: Hill (R T), 90l  
 Rock salt: Harris, 09  
 Runnels Co.: Beede, 18  
 Salines, origin: Norton, 15  
 Salines as geologic thermometer: Lachmann, 12  
 Salt: Harris, 09  
 Salt dome structure: Lucas (A F), 18  
 Salt domes, origin: Dumble, 18b; intrusive origin: Rogers (G S), 18a  
 San Saba Co.: Gregg, 89  
 Santo Tomas cannel coal, Webb Co.: Ashley, 18a  
 Silver, Chisos country: Udden, 07a  
 Shafter district, Presidio Co.: Kirk, 09; Phillips (W B), 10b; Udden, 04  
 Smith Co.: Herndon, 91  
 Southern Tex.: Jermy, 89; Owen (J), 89; Tait, 89  
 Southwestern Tex.: Comstock, 92  
 Structural materials: Burchard, 10b  
 Sulphur: Baldacci, 06; Lucas (A F), 12; Pogue, 17c; Smith (E A), 96d  
 Culberson Co.: Phillips (W B), 12a, 17  
 El Paso Co.: Richardson (G B), 05b  
 Rustler Springs: Porch, 17  
 southwestern Tex.: Becker (C M), 14  
 trans-Pecos region: Caracristi, 05; Phillips (W B), 02; Thomas (K), 18a  
 Sulphur and sulphur oil deposits of Coastal Plain: Lucas (A F), 12  
 Tale, Llano and Burnet quadrangles: Paige, 12  
 Terrell Co.: Christner, 18  
 Thrall oil field: Udden, 18b  
 Tin: Dinsmore, 09c, 10c  
 central Texas: Comstock, 91a, b  
 El Paso Co.: Chauvenet, 10, 11; Weed, 01a, 03a  
 Franklin Mountains: Richardson (G B), 06a, 09  
 Toyah oil fields, Reeves Co.: Dinsmore, 10a; Wallace (H V), 11a  
 Trans-Pecos oil fields: Wallace (H V), 11c  
 Trans-Pecos region: Richardson (G B), 04, 05a; Streeruwitz, 90, 91, 92, 93  
 Uvalde quadrangle: Vaughan, 00  
 Val Verde Co.: Roberts (J R), 18  
 Van Horn quadrangle: Richardson (G B), 14  
 Volcanic dust: Dumble, 92f  
 Webb Co.: De Ryee, 88  
 Western Texas: Streeruwitz, 89, 89a  
 Zinc, Culberson Co.: Udden, 14d; Llano-Burnet region: Paige, 11  
*Historical geology.*  
 Anderson Co.: Dumble, 91c  
 Anthracolithic rocks: Prosser (C S), 10  
 Apache (Davis) Mountains, western Tex.: Osann, 96  
 Archean: Harrod, 88  
 Archer Co., geologic map: Rössler, 76  
 Austin chalk: Prather, 02  
 Austin quadrangle: Hill (R T), 02  
 Beaumont oil field: Dumble, 01d



## Texas—Continued.

*Historical geology—Continued.*

- Big Bend region: Hill (R T), 02e  
 Black and Grand prairies: Hill (R T), 01  
 Blanco formation: Cope, 92h  
 Boring, Austin: Shumard (B F), 59c  
   Galveston: Dumble, 93c; Hill (R T), 92c; Singley, 92  
   northern Tex.: Shaw (E W), 16a  
   northwestern Tex.: Udden, 15a  
   Spur, Dickens Co.: Udden, 14a  
 Brazos Co.: Kennedy, 93  
 Brenham salt dome, Washington and Austin cos.: Hopkins (O B), 17a  
 Buda limestone: Shattuck, 03  
 Burnet Co., Granite Mountain: Simonds, 97a  
 Caddo oil and gas field: Matson, 16b  
 Camp Bowie area: Shuler, 17  
 Carboniferous: Blake (W P), 56c; Cummins, 88a; Marcou, 61; Richardson (G B), 10a; Tarr, 90b  
 Carrizo sands: Dumble, 11a  
 Castile gypsum and Rustler formation, age: Udden, 15b  
 Cenozoic deposits: Dumble, 94; Staked Plains: Cope, 92q  
 Central mineral region: Comstock, 91  
 Central Tex.: Comstock, 90  
 Chalk formations of northeastern Tex.: Gordon (C H), 09; Hill (R T), 09  
 Chisos country: Udden, 07a  
 Choctaw and Grayson terranes: Cragin, 94a  
 Citronelle formation: Matson, 16  
 Coal field, central, southern border: Cummins, 90  
 Coal fields, Colorado River: Tarr, 90  
 Coal Measures, northern Tex.: Shumard (B F), 60e  
 Coastal Plain: Deussen, 14; Kennedy, 17  
 Colorado coal field: Drake, 93, 17  
 Comanche series: Hill (R T), 91  
 Concho country: Cummins, 90b  
 Copper region, northern Tex.: Furman, 81  
 Corsicana oil field: Matson, 17b  
 County geologic maps: Rössler, 76  
 Cretaceous: Cope, 87f; Cragin, 97b; Hill (R T), 87b, 88d, 89, 89a, d, e, g, i, 90, 90e, 97; Marcou, 61, 90b, 94; Roemer, 52; Shumard (B F), 60, 60g, 63b, c; Tarr (R S), 92a; White (C A), 87d, 89c  
   Brewster and Presidio cos.: Dumble, 02b  
   Coahuila: Dumble, 95  
   El Paso region: Stanton, 96a; Taff, 91  
   north of Colorado River: Taff, 92a, 93  
   subdivisions: Taff, 93a  
   western Tex.: Dumble, 95  
 Cretaceous river bed, San Marcos, Hays Co.: Pond, 87  
 Cretaceous-Eocene contact: Stephenson, 15  
 Cross Timbers region: Hill (R T), 87a  
 Culberson Co.: Phillips (W B), 17  
 Dallas region: Matson, 16c; Shuler, 18  
 Diabolo Mountains, red sandstone: Dumble, 02a  
 Double Mountain section: Dumble, 92d  
 Drift, Gainesville: Ragsdale, 88; sources: Dumble, 92e

## Texas—Continued.

*Historical geology—Continued.*

- Eastern Tex.: Kennedy, 92; Penrose, 89  
 Edwards Plateau: Hill (R T), 98b  
 El Paso quadrangle: Richardson (G B), 09  
 Eocene: Berry, 16a; Dumble, 11; Hellprin, 86a  
   east of Brazos River: Kennedy, 95a  
   Port Caddo landing, Harrison Co.: Vaughan, 95a  
 Eocene history, coastal area: Dumble, 15c  
 Fresh-water Tertiary, northwestern Tex.: Gidley, 03b  
 Franklin Mountains: Richardson (G B), 06c  
 Galveston boring: Singley, 93  
 General: Blake (W P), 56, 56a; Boll, 80; Buckley, 66, 74; Burleson, 74; Cope, 94b; Cummins, 93c; Dumble, 90, 92, 92a, 16a; Hill (R T), 87, 92b, 93, 02b; Kennedy, 93a; Marcou, 54a, 55a, b, 56, 58a; Moore (F jr), 59; Roemer, 46, 48, 49, 53a; Rössler, 68; Shumard (B F), 59; Tarr (R S), 90c; Udden, 16a  
 Geologic map: Udden, 16a  
   county maps: Roessler, 76  
 Glass Mountains: Udden, 17  
 Glen Rose limestone: Shuler, 17a  
 Grimes Co.: Kennedy, 93  
 Guadalupe Mountains: Girty, 02; Tarr, 92  
 Guadalupian section: Beede, 10  
 Guadalupian stratigraphy: Girty, 09a  
 Gulf Coastal Plain: Hayes, 03a  
 Gulf Tertiary: Penrose, 90  
 Houston Co.: Dumble, 91c; Kennedy, 92a  
 Humble oil field, Harris Co.: Deussen, 17  
 Igneous rocks, central Tex.: Hill (R T), 90h  
 Iron ore district, eastern Tex.: Dumble, 91b; Kennedy, 91, 94a; Walker (J B), 91  
 Jurassic: Marcou, 96a; marine, southwestern Tex.: Cragin, 97a  
 Kaufman Co.-Sabine Pass: Kennedy, 92b  
 Kent section: Dumble, 93b  
 Lignite area: Dumble, 92b  
 Lignitic stage: Harris, 97  
 Llano and Burnet quadrangles: Paige, 12  
 Llano Estacado: Jenney, 74; Ruffner, 77; Shumard, 92; northern: Baker (C L), 15; and westwardly: Cummins, 92a  
 Llano series, age: Barrell, 17  
 Malone district: Cragin, 05  
 Midway stage: Harris, 96  
 Mitchell Co.: Broadhead, 88  
 North-central Tex.: Hager, 18a; Kempher, 18  
 Northeastern Tex.: Burchard, 15; Gordon (C H), 11; Johnson (L C), 88; Stephenson, 18  
 Northern Tex.: Cummins, 89  
 Northwestern Tex.: Cummins, 91, 92, 93; Marcou, 92a  
 Nueces quadrangle: Hill (R T), 98a  
 Oil and gas-bearing formations: Phillips (W B), 01  
 Oil and gas fields, Wichita and Clay cos.: Udden, 12d  
 Oil fields, north-central Tex.: Hager, 18a  
 Oil pools, Gulf Coast country: Matteson, 18  
 Ordovician, Burnet Co.: Shumard, 60d  
 Organ Mountains: Jenney, 74



## Texas—Continued.

*Historical geology—Continued.*

- Paleozoic, central Tex.: Tarr, 90d; Walcott, 84c  
trans-Pecos region: Richardson (G B), 08  
Palestine salt dome, Anderson Co.: Hopkins  
(O B), 17  
Palo Pinto Co.: Pepperberg, 15; Wegemann, 15e  
Panhandle: Gould, 07  
Permian: Cummins, 90a, 97, 08; Hill (R T), 89h;  
Shumard (B F), 58g; Tarr, 92c; White  
(C A), 88e, 91; Williston, 10; Wrather, 17  
northwestern Tex.: Cummins, 91  
western Tex.: Girty, 02  
Permo-Carboniferous: Richard, 15  
Glass Mountains: Böse, 17a  
Pilot Knob, Cretaceous volcano: Hill (R T), 90f  
Pre-Cambrian geology, Llano Co.: Paige, 10  
Primordial: Shumard (B F), 61  
Quanah, Hardeman Co.: Wegemann, 15g  
Red beds: Adams (G I), 02d, 03a; Case, 07c, 09,  
13, 14, 15; origin: Baker (C L), 16  
Red River region: Hill (R T), 94  
Rio Grande embayment: Udden, 07  
Rio Grande region: Schmitz, 85; Schott, 55;  
Vaughan, 00b; White (C A), 87  
Rio Grande valley: Dumble, 92c; Hill (R T),  
98b; Owen (J), 88  
Robertson Co.: Kennedy, 93  
Rudistes horizon: Douvillé, 98  
Runnels Co.: Beede, 18  
Rustler Springs region: Porch, 17  
Salt domes: Harris, 08  
San Antonio area: Muir (A H), 11  
San Carlos coal field, trans-Pecos: Vaughan, 96a  
Shafter district, Presidio Co.: Udden, 04  
Sierra Blanca, Jurassic: Stanton, 98b  
Smith Co.: Herndon, 91  
Southern Tex.: Jermy, 89; Owen (J), 89; Taff,  
92; Tait, 89  
Southwestern Tex.: Comstock, 92; Dumble, 03  
Staked Plains: Cummins, 92  
Terlingua district, Brewster Co.: Hill (B F), 02;  
Udden, 17b  
Terrell Co.: Christner, 18  
Tertiary: Dumble, 95b, 02d, 09; Heilprin, 84a;  
Penhallow, 07c; western Tex.: Hill (R T),  
91f  
Tertiary sands: Dumble, 15  
Thrall oil field: Udden, 16b, 18b  
Trans-Pecos Tex.: Richardson (G B), 04, 04b;  
Streeruwitz, 90, 91, 92, 92a, 93  
front range: Baker (C L), 17  
Paleozoic formations: Richardson (G B), 08  
Triassic: Sternberg, 83a; northwestern Tex.:  
Drake, 92  
Trinity formation: Hill (R T), 88a  
Tucumcari region: Marcou, 93a  
Uvalde quadrangle: Vaughan, 00  
Val Verde Co.: Roberts (J R), 18  
Van Horn quadrangle: Richardson (G B), 14  
Western Tex.: Hill (R T), 88b, 92; Jenney,  
74, 74a; Kimball, 69; Newberry, 74o;  
Shumard (G G), 86; Streeruwitz, 89  
Wichita formation: Gordon (C H), 11a  
Wichita region: Gordon (C H), 13  
Wichita-Brazos red beds: Gordon (C H), 09a  
Wise Co., Bridgeport and Chico: Böse, 17

## Texas—Continued.

*Mineralogy.*

- Alunite: Wherry, 16a  
Baringer Hill pegmatite dike: Hess, 08  
Barite from oil wells: Moore (E S), 17  
Calcite, Terlingua: Eakle, 07; Sachs, 07  
Calcite crystals: Schaller, 08a  
Calomel: Goldschmidt, 08  
Celestite, Lampasas Co.: Kunz, 86e  
Central Tex.: Comstock, 90  
Gadolinite, Llano Co.: Goldsmith, 89  
General: Simonds, 01, 02  
Gypsum: Cummins, 92  
Kleinite: Sachs, 05, 06  
Lancaster Co.: Shepard, 48  
Llano Co., Hidden, 05; yttria and thoria  
minerals: Hidden, 89  
Mackintoshite, Llano Co.: Hidden, 93  
Mercury minerals, Terlingua: Hill (B F), 03;  
Hillebrand, 05d, 07a, 09; Moses, 03  
Meteorites: Cummins, 92b; Howard, 06; Silli-  
man (jr), 46  
Bluff: Charlton, 01  
Brazos River: Shumard (B F), 60b  
Carlton, Hamilton Co.: Howell (E E), 90, 90a  
Davis Mountains, Jeff Davis Co.: Farrington,  
14  
Estacado: Howard, 06a  
Fort Duncan, Maverick Co.: Hidden, 86b  
Fayette Co.: Merrill (G P), 18a; Meunier, 88;  
Ward & Howell, 88, 88a; Whitfield (J E),  
88  
Iredell, Bosque Co.: Cohen, 03; Foote (W M),  
99a  
Kendall Co.: Cohen, 92  
Mart: Charlton, 01; Merrill (G P), 99a, 00  
Maverick Co.: Hidden 86d  
Pipe Creek, Brandera Co.: Ledoux, 89  
Plainview: Merrill (G P), 17, 18  
San Angelo, Tom Green Co.: Preston (H L),  
98a  
Wichita Co., Rio Brazos: Cohen, 91, 92;  
Mallet, 84  
Mineral localities: Simonds, 02  
Mosesite, Terlingua: Canfield, 10  
Pisolitic barite: Wuestner, 06  
Powellite: Schaller, 08  
Quicksilver minerals, Terlingua: Hill (B F), 03  
Rare-earth minerals, Baringer Hill, Llano Co.:  
Hess, 08e  
Rowlandite, Llano Co.: Hidden, 91a, 93a  
Topaz: Kunz, 94  
Uraninite, Llano Co.: Hillebrand, 91  
Yttrialite, Llano Co.: Hillebrand, 05b; Luquer,  
93  
Yttrium minerals, Llano Co.: Hidden, 89a  
Yttrocrasite: Hidden, 06  
*Paleontology.*  
Alligator snapper: Hay (O P), 11  
Ammonites: Gabb, 60d  
Araeoscelis, Seymour: Williston, 14c  
Armadillo: Gidley, 92  
Black and Grand prairies: Hill (R T), 01  
Blanco beds: Cope, 92c, n  
Bolosaurus: Broom, 13a  
Bolosaurus striatus Cope: Case, 07b  
Brachauchenius, skull: Williston, 07



## Texas—Continued.

*Paleontology*—Continued.

- Brachiopod, Potsdam sandstone: Shumard (B F), 60c  
 Broiliellus, Permian amphibian: Williston, 14b  
 Buchiceras, Cretaceous: Cragin, 00a  
 Buda limestone: Whitney (F L), 11; corals: Vaughan, 03  
 Caenobasileus: Cope, 77j  
 Caprina limestone beds, Invertebrata: Hill (R T), 93b  
 Carboniferous, ammonite: Heilprin, 84c  
 Cephalopoda: Hyatt, 91, 93  
 Fort Belknap: Gabb, 59a  
 Goniatites: Gabb, 61f  
 Carnivora: Cope, 92g  
 Catahoula sandstone flora: Berry, 16e  
 Cephalopoda, Cretaceous: Schlüter, 87a; in museum of University of Texas: Pritchett, 05  
 Chamidae, Cretaceous: White (C A), 84a  
 Chondrodonta, Cretaceous: Stanton, 01  
 Clavilithes, Eocene: Johnson (C W), 02  
 Coastal Plain: Deussen, 14  
 Cockroaches: Cockerell, 12d  
 Comanchean invertebrates: Cragin, 94b  
 Coprolites, Permian: Neumayer, 04  
 Cotylosauria: Case, 11  
 Cretaceous: Conrad, 55c; Giebel, 53, 53a; Hill (R T), 87b, 89a, c, i; Prather, 01; Roemer, 52, 88; Shumard (B F), 53, 60a  
 Ammonites: Lasswitz, 04  
 gryphaeas: Hill (R T), 98  
 Invertebrata: Cragin, 93; Hill (R T), 89; White (C A), 80c  
 Mollusca: Hill, 89c; White (C A), 87c  
 Cricotus, distribution: Case, 15d  
 Cycad, Cretaceous, Maverick Co.: Udden, 08a  
 Date palm, Tertiary: Berry, 14f  
 Diacranodus: Broili, 04a  
 Diadectes, Permian: Cope, 78zb  
 Diadectidae, osteology: Case, 05  
 Diatoms, Staked Plains: Woolman, 92a  
 Dimetrodon: Case, 05a; Permian, Texas: Cope, 86o  
 Dimetrodon incisivus, Archer Co.: Case, 10c, 15b  
 Dinocyon, Miocene: Matthew (W D), 02a  
 Dinosaur tracks in Glen Rose limestone: Shuler, 17a  
 Diplocaulia: Moodie, 12  
 Diplocaulus: Huene, 12a  
 Dissorophus: Williston, 10a; Texas Permian: Cope, 95i  
 Echinoidea, Buda limestone: Whitney (F L), 16  
 Edaphosaurus, Archer Co.: Case, 14a, 18  
 Elephas: Blake (C C), 62  
 Eocene: Aldrich, 11; Berry, 16a; Mollusca: Conrad, 65f; Heilprin, 91  
 Equus scotti, Rock Creek: Troxell, 17a  
 Equus skull, Equus bed: Cope, 91f  
 Eryops, Permian: Broili, 99; Huene, 12  
 Fossil woods: Penhallow, 07c; Platen, 08  
 Galveston, boring: Harris, 93  
 Gastropoda, Coal Measures: Shumard (B F), 60c

## Texas—Continued.

*Paleontology*—Continued.

- Glyptodon, Nueces Co.: Cope, 88l  
 Glyptotherium, Pleistocene: Osborn, 03b  
 Goniolina in Comanche series: Hill (R T), 90a  
 Graptocarcinus, Cretaceous: Roemer, 87a  
 Guadalupe Mountains: Girty, 02; Shumard (B F), 59a, d  
 Guadalupian fauna: Girty, 08  
 Hindeastraea, Cretaceous: White (C A), 88f  
 Horse, Pleistocene, Staked Plains: Gidley, 00  
 Inoceramus, Cretaceous: Schlüter, 87a  
 Invertebrates, Panhandle: Beede, 07  
 Labidosaurus, Permian, Texas: Williston, 17  
 Labidosaurus hamatus, mounted skeleton: Broili, 08  
 Linearia, Cherokee Co.: Johnson (C W), 04  
 Lizard, Permian: Williston, 13d  
 Lysorophus, Permian: Huene, 13b; Williston, 08c  
 Lysorophus tricarlinatus, skull: Case, 08  
 Macraster, Cretaceous: Roemer, 88b  
 Malone fauna: Cragin, 05  
 Mammalia, Washington Co.: Leidy, 60c  
 Mastodon, Hondo, Medina Co.: Mackensen, 05  
 Mesozoic flora: Berry, 12c  
 Mollusca: Meek, 71d  
 Buda limestone: Shattuck, 03  
 Cretaceous: Conrad, 53c  
 Tertiary: Conrad, 67f  
 Myalina, Coal Measures: Whitfield, 02  
 Mycterosaurus longiceps, Mitchell Creek: Williston, 15a  
 Mylodon, Briscoe Co.: Lull, 15b  
 Myristica, Trinity Co.: Berry, 16i  
 Naosaurus, Permian: Cope, 86o; Osborn, 07b  
 Nassa, Beaumont: Aldrich, 01  
 Neocene Mollusca, Galveston well: Harris, 95a  
 Northwestern Tex.: Cummins, 91  
 Omalaxis, Eocene, Lee Co.: Aldrich, 90  
 Panhandle region, vertebrate fossils: Lull, 13a  
 Pantylus cordatus: Mehl, 12  
 Pectinidae, Cretaceous: Kniker, 18  
 Pelycosaur: Case, 04b  
 Pelycosauria: Broili, 04b; Poecilospondylus francisi: Case, 10b  
 Pelycosaurian, four-horned, Permian: Matthew (W D), 08c  
 Permian: Cope, 83d, 84j; White (C A), 89d, 91  
 Amphibia and Pisces: Case, 10a, 11a  
 Amphibia and Reptilia: Cope, 78l, 81  
 amphibians: Williston, 08e  
 crinoid fauna: Weller, 09b  
 fishes: Hussakof, 11a  
 fishes and reptiles: Cope, 83i  
 invertebrates: Leuchs, 08  
 insects: Sellards, 11  
 plants, Wichita beds: White (I C), 92a  
 reptiles: Matthew (W D), 09c; Williston, 13, 14c, 15b  
 vertebrates: Case, 03a; Cope, 81f, 82c; Williston, 10, 10c, 11  
 localities and horizons: Cummins, 08  
 osteology: Williston, 16  
 western Texas: Girty, 02  
 Permo-Carboniferous ammonoids, Glass Mountains: Böse, 17a



**Texas—Continued.***Paleontology—Continued.*

- Petrified wood, Bastrop: Dumble, 89b  
 Plants, Caddo Landing: Knowlton, 95; Trinity  
   beds: Fontaine, 93a  
 Platygonus, Pliocene: Gidley, 03a  
 Pliocene horses: Cope, 85x  
 Pliocene Mollusca: Dall, 13  
 Poikilosakos, Carboniferous, Young Co.: Wat-  
   son (D M S), 17  
 Porocystis, Cretaceous: Rauff, 95; Jarvis, 05  
 Porocystis pruniformis: Böhm, 12  
 Preptoceras, Rock Creek: Troxell, 15a  
 Rediscovery of some Conrad forms: Dumble,  
   11c  
 Richthofenia: Böse, 16  
 Salenia texana: Credner, 75  
 Saratoga well: Dumble, 06  
 Scalpellum and Balanus: Pilsbry, 97b  
 Sepia, Eocene: Gabb, 60e  
 Seymouria, restoration: Williston, 11c  
 Spongidae, flint nodules, Cretaceous: Merrill  
   (J A), 95  
 Stegocephala: Broili, 13; and Reptilia: Broili,  
   04  
 Tertiary: Conrad, 55c, 56b; Mollusca: Aldrich,  
   95; Harris, 95b  
 Tomiopsis, Lapara Creek: Cope, 93a  
 Tortoise: Hay (O P), 02a  
 Tracks in the Del Rio clay: Udden, 08  
 Trematops, Permian: Williston, 09b  
 Triassic Unionidae, Staked Plains: Simpson  
   (C T), 96  
 Trimerorhachis: Williston, 15, 16b  
 Trinity beds, Invertebrata: Hill (R T), 93a  
 Tucumcari fauna: Hyatt, 93a  
 Varanosaurus: Williston, 10e  
 Vertebrate types in University of Texas mu-  
   seum: Montgomery, 04  
 Vertebrata: Carpenter (W M), 46; Cope, 92;  
   Hay (O P), 16a  
   Brazos River: Jeffries, 57  
   Harden Co.: Leidy, 68  
   Llano Estacado: Cope, 93  
   Panhandle: Cope, 92o; Lull, 13a  
   Rock Creek: Troxell, 15  
 Woods, fossil: Penhallow, 07c; Platen, 08  
 Xenarthra (Edentata), Pleistocene: Hay  
   (O P), 16  
 Zatrachys: Case, 07d

*Petrology.*

- Apache (Davis) Mountains, western Tex.:  
   Osann, 96  
 Catahoula sandstone, origin: Goldman, 15  
 Llano and Burnet quadrangles: Paige, 12  
 Melilite-nepheline basalt: Osann, 93a  
 Nepheline basalt: Kemp, 90a  
 Oolitic and pisolitic barite, Saratoga oil field:  
   Moore (E S), 14a  
 Quartz-feldspar porphyry, Llano: Iddings, 04a  
 San Carlos and Chispa: Lord (E C E), 00  
 Trans-Pecos Tex.: Osann, 93  
 Tuffs: Julien, 81a  
 Volcanic dust, Dickens Co.: Dumble, 95a; Tur-  
   ner, 95d

*Physical geology.*

- Black and Grand prairies: Hill (R T), 01

**Texas—Continued.***Physical geology—Continued.*

- Catahoula sandstone, origin: Goldman, 15  
 Clay dunes: Coffey, 09  
 Galveston, coast changes: Howell (C W), 74  
 Gravels, origin: Udden, 14b  
 North central Tex.: Hager, 18a  
 Rockwall: Paige, 09b  
 Salt domes, origin: Dumble, 18b  
 Trans-Pecos Tex., front range: Baker (C L), 17  
 Wise Co., Bridgeport and Chico: Böse, 17

*Physiographic geology.*

- Austin quadrangle: Hill (R T), 02  
 Black and Grand prairies: Hill (R T), 01  
 Camp Bowie area: Shuler, 17  
 Central Tex., superimposition of drainage:  
   Tarr, 90e  
 Clay dunes: Coffey, 09  
 Coast prairie: Hill (R T), 01a  
 Coastal region: Kennedy, 17; Sutherland, 08  
 Colorado River: Hill (R T), 89f  
 Cretaceous river bed, San Marcos, Hays Co.:  
   Pond, 87  
 Cross Timbers region: Hill (R T), 87a  
 Edwards Plateau: Hill (R T), 98b  
 Galveston region: McGee, 00  
 General: Bollaert, 51; Hill (R T), 91d; Lough-  
   ridge, 84b; Simonds, 05; Tarr (R S), 90c,  
   93a; Udden, 16a  
 Geographic features: Hill (R T), 90b  
 Hardin Co., Sour Lake: Rössler, 76c  
 High Plains: Johnson (W D), 01  
 Llano and Burnet quadrangles: Paige, 12  
 Llano Estacado, northern: Baker (C L), 15  
 Rio Grande Plain: Hill (R T), 98b  
 San Antonio region: Stephenson, 18b  
 Staked Plains: Hill (R T), 90i  
 Terraces, Colorado River: Tarr, 92e  
 Topography: Hill (R T), 92a  
 Trans-Pecos Tex., front range: Baker (C L), 17  
 Van Horn quadrangle: Richardson (G B), 14  
 Western Tex.: Hill (R T), 92

*Underground water.*

- Artesian water: Rössler, 90  
   Austin: Shumard (B F), 59c  
   Gulf coast slope: Singley, 93  
   southwestern Tex.: Deussen, 13  
 Black and Grand prairies: Hill (R T), 01  
 Coastal Plain: Deussen, 14; Taylor (T U), 07  
 Cretaceous area, north of Colorado River: Taff,  
   93  
 Edwards Plateau: Hill (R T), 98b  
 El Paso quadrangle: Richardson (G B), 09  
 General: Dumble, 89, 91a; Hill (R T), 93  
 Lasalle and McMullen cos.: Deussen, 16  
 Llano Estacado: Cummins, 92; Shumard, 92;  
   northern: Baker (C L), 15  
 Northeastern Tex.: Gordon (C H), 11  
 Panhandle: Gould, 07  
 Rio Grande Plain: Hill (R T), 98b  
 San Antonio area: Muir (A H), 11  
 Southern Tex.: Taff, 92  
 Trans-Pecos Tex.: Richardson (G B), 04  
 Val Verde Co.: Roberts (J R), 18  
 Western Tex.: Dumble, 90a  
 Wichita region: Gordon (C H), 13



## Textbooks.

- Abrégé de géologie:** Huard, 13  
**Building stones and clays:** Richardson (C H), 17  
**Characters of crystals:** Moses, 99  
**Chemical analysis of rocks:** Washington, 04, 10  
**Chemical geology:** Crosby, 97  
**Chemical tests for minerals:** Burdick, 17  
**Compend of geology:** Le Conte, 84  
**Crystallography:** Bayley, 10; Butler (G M), 18a; Patton, 96; Wadsworth, 09; Walker (T L), 14; Williams (G H), 90a  
**Dana's Manual of mineralogy:** Ford (W E), 12  
**Determination of minerals and rocks:** Hobbs, 14  
**Diagrams of crystals:** Egleston, 66  
**Dynamic geology:** Crosby, 92  
**Economic geology:** Emmons (W H), 18; Richardson (C H), 13; Ries, 05, 10a, 14a; Smith (F H), 90; Williams (S G), 86  
**Canada:** Willmott, 97  
**syllabus of lectures:** Branner, 95, 11b  
**Economic geology of the United States:** Tarr, 94  
**Elementary geology:** Adams (H T W), 68; Andrews (E B), 78a; Ansted, 69; Branner, 15b; Brigham, 01; Cleveland, 16; Cotting, 35; Dana (J D), 64, 75; Emmons (E), 60; Godding, 47; Gray, 53; Hall (S R), 68; Heilprin, 96; Hillside, 59; Hitchcock (E), 40, 66; Kcdzie, 77; Lee (C A), 40; Loomis, 52; Lyell, 39, 53, 71, 96; Mather, 33; Nicholson, 72; Norton, 05; Page, 46, 49; Phillips (W), 16; Randall, 46; Renwick, 38; Roberts, 93; Safford, 76; St. John, 51; Seeley, 95; Steele, 71; Tarr, 97; Trimmer, 42; Van Rensselaer, 25; Wells, 64; Welsh, 32; Winchell (A), 86.  
**Elements of geology:** Blackwelder, 11a; Comstock, 47; Le Conte, 78; Mitchell, 42; Ruschenberger, 52  
**Elements of mineralogy and geology:** Laflamme, 81  
**Engineering geology:** Ries, 14  
**Erklärende Beschreibung der Landformen:** Davis (W M), 12  
**Examination of prospects:** Gunther, 12  
**Field geology:** Lahee, 16  
**First principles of geology:** Barbee, 68  
**Geological excursions:** Winchell (A), 84  
**Geology:** Bárcena, 86; Chamberlin (T C), 04, 14; Cleland, 16; Comstock, 78; Denton, 68; Emmons (E), 26; Foster, 50; Hall (C W), 97; Pirsson, 15; Rio, 95, 41; Tenney, 60  
**Geology and mineralogy:** Hamman, 11  
**Geometrical crystallography:** Butler (G M), 18  
**Guide to minerals:** Gratacap, 12  
**Historical geology:** Miller (W J), 16  
**Igneous rocks:** Iddings, 09; Finlay, 13  
**Introduction:** Bakewell, 29  
**Introduction to geology:** Scott (W B), 97  
**Laboratory exercises in structural and historical geology:** Salisbury, 13  
**Laboratory guide:** Smith (J E), 17  
**Laboratory manual in physical geography:** Hopkin, 09s  
**Lecture notes:** Fontaine, 98  
**Lectures on geology, synopsis:** Rogers (H D), 35a

## Textbooks—Continued.

- Lithology:** Williams (E H), 86; elementary: Barton, 01  
**Manual of geology:** Dana (J D), 63  
**Manual of petrographic methods:** Johannsen, 14  
**Metamorphic geology:** Leith, 15  
**Military geology and topography:** Gregory (H E), 18  
**Mine examiner and prospector's companion:** Miller (G W), 07  
**Mineral systems:** Chapman, 04  
**Mineralogy:** Aikin, 15; Butler (G M), 18a; Comstock, 27; Dana (J D), 37, 48; Dana (E S), 77, 92, 95, 16; Emmons (E), 26; Erni, 85; Foye, 86; Hitchings, 85; Landero, 88; Phillips (A H), 12; Phillips (W), 44; Richards (E H), 82, 84; Rogers (A F), 12; Shepard, 32, 35; Spencer (L J), 16  
**Mineralogy, descriptive:** Bayley, 17; Kraus, 11  
**Mineralogy, determinative:** Brush, 74; Endlich, 92; Lewis (J V), 13; Wheeler (C G), 80; key: Cubberley, 95  
**Mineralogy, elementary:** Comstock, 41; Phillips (W), 18; elementary course in: Poey, 72  
**Mineralogy of Colorado:** George (R D), 13  
**Minerals, pocket handbook of:** Butler (G M), 08  
**Minerals, useful:** McLeod, 14  
**Minerals and rocks:** Bayley, 15  
**Mining geology:** Miller (G W), 03, 06  
**North America:** Eaton (A), 32  
**North American index fossils:** Grabau, 09f  
**North Carolina:** Mitchell, 42  
**Notes on mineralogy:** Whitman, 72  
**Optical mineralogy:** Edwards (M G), 16; Winchell (A N), 11; elements of: Winchell (N H), 09a  
**Ore deposits:** Kemp, 93  
**Organic evolution:** Lull, 17  
**Outlines of geology:** Comstock, 34  
**Paleontology:** Eastman, 00, 13; Rio, 41; Shimer, 14  
**Petrology:** Rutley, 79  
**Physical geography:** Davis (W M), 98b, 08; Dryer, 01; Gilbert, 02; Hopkins (T C), 08a; Martin (L), 13h; Tarr, 97a, b, 04; laboratory manual: Brigham, 05; Tarr (R S), 10b  
**Physiography:** Arey, 11; Tarr (R S), 14; Salisbury, 07  
**Practical mineralogy:** Rowe, 11  
**Practical physiography:** Fairbanks, 06  
**Practical field geology:** Farrell, 12  
**Practical geology and mineralogy:** Hamman, 11  
**Rocks and minerals:** Cobb, 15  
**Rocks and rock minerals:** Pirsson, 08  
**Rock minerals:** Iddings, 06  
**Structural geology:** Leith, 13  
**Syllabus of historical geology:** Grabau, 12a  
**Syllabus of lectures on elementary geology:** Branner, 02  
**Syllabus of lectures on field geology:** Keyes, 16  
**Syllabus of lectures on geology:** Cope, 90  
**Synopsis of mineral characters:** Richards (R W), 07  
**Synopsis of sedimentary rocks:** Clark (W B), 88  
**Tables for determination of minerals:** Frazer, 75, 10; Kraus, 11a  
**Tennessee:** McAdoo, 81



**Textbooks—Continued.**

- Text-book of geology: Chamberlin (T C), 05  
 United States, geology: Blackwelder, 12  
 Thalia: Owen (D D), 53a  
 Thallium: Browning, 17a  
 Thaynes fauna: Girty, 10b  
 Theresa quadrangle, N. Y.: Cushing, 10a  
 Thermal microscope: Wright (C A), 13  
 Thermal waters.  
   Arkansas, Hot Springs district: Weed, 02, 05f  
   Association with anticlines in Virginia: Rogers (W B), 43b  
   Cause: Hixon, 11  
   Economic value: Weed, 05e  
   General: Wilson (J F), 10  
   Genesis: Gautier, 06  
   Georgia, Warm Springs: Weed, 05f  
   Hot springs at Thermopolis: Darton, 06a  
   Hot springs deposits: Weed, 05e  
   Mexico, Guanajuato: Villafañá, 08; Comanjilla: Wittich (E), 10b  
   Querétaro, Montenegro: Villarello, 09  
   Nevada, Wedekind: Wendeborn, 04  
   New Mexico, Ojo Caliente: Lindgren, 10a  
   Thermal springs: Peale, 72, 77d; Virginia: Rogers (W B), 43b  
   United States: Daubeny, 39b  
   Yellowstone National Park: Hague, 11; Hayden, 72c; Weed, 89; radioactivity: Schlundt, 09  
 Thermometamorphism, igneous rocks: Harker, 92a  
 Thermometry, geologic: Wright (F E), 10b  
 Thermopolis hot springs, Wyo.: Darton, 06a  
 Thermopolis sulphur deposits, Wyo.: Woodruff, 09b  
 Theromorpha, relations to Mammalia: Cope, 85d  
 Theropoda: Marsh, 84b  
 Thescelosaurus, Lance formation, Wyoming: Gilmore, 15b  
 Thescelosaurus neglectus: Gilmore, 13  
 Thinolite, Lake Lahontan: Dana (E S), 84a  
 Thompson, Zadoc, biography: Houghton, 56; Kneeland 56; Perkins (G H), 02a  
 Thomsonslates, Minn.: Spurr, 94e  
 Thorium: Baskerville, 08; Schaller, 17c  
 Thousand Islands region, N. Y.: Cushing, 10a  
 Three Forks folio, Mont. (no. 24): Peale, 96  
 Thresherodiscus: Foerste, 14b  
 Thrust planes in Great Basin ranges: Keyes, 09n  
 Thunder Mountain landslide: Baumgarten, 10  
 Tiburon Island, Mex.: Jones (F A), 10  
 Tidal scour: Gulliver, 96b  
 Tide marshes: Nesbit, 85; Warren (G M), 11  
 Tide pools, Vancouver Island, B. C.: Henkel, 06  
 Tides.  
   General: Chamberlin (T C), 09  
   geologic action: Davis (C H), 49a  
   influence upon earth's rotation: Chamberlin (T C), 08a  
 Tidewater gneiss: Martin (D S), 85a  
 Tight, W. G., biography: Bownocker, 11  
 Tijeras coal field, N. Mex.: Lee (W T), 12  
 Tilbury oil field, Ont.: Coste, 07, 07a  
 Tilia: Berry, 07a  
 Till, composition: Crosby, 91a  
 Tillite: Sayles, 14; New Hampshire: Sayles, 15  
 Tillodontia: Marsh, 76a

**Tilting.**

- Craigton Lake, tilted shore lines: Hubbard (G D), 14a  
 Great Lakes region: Gilbert, 97a, 98  
 New York, western: Fairchild, 02  
 Ohio, Ashland and Wayne cos.: Hubbard (G D), 14  
 Timiskaming. *See* Ontario.  
 Tin.  
   Alaska, Birch Creek district: Johnson (B L), 10  
   Bibliography: Hess, 09, 12c  
   California, San Diego Co.: Schaller, 16  
   General: Boalich, 18a; Fawns, 05; Hess, 05; Knopf, 18d; Rolker, 95; Struthers, 04  
   Genetic relations: Singewald, 12a  
   Geologic features: Ferguson (H G), 12  
   Mexico: Anon, 17  
   Nevada, northern, wood tin: Knopf, 16a  
   United States: Fawns, 05; Garrison, 04b; U S G S, 83  
   Virginia, Irish Creek: Ferguson (H G), 18, 18a  
 Tinoceras: March, 72k, l, 73g, h  
 Tintic district, Utah: Brinsmade, 08; Lindgren, 15d; Tibby, 18  
 Tintic folio, Utah (no. 65): Smith (G O), 00  
 Tishomingo folio, Okla. (no. 98): Taff, 03  
 Titanic iron ores, microstructure: Warren (C H), 18  
 Titaniferous magnetites, microstructure: Singewald, 13  
 Titanium. *See also* Rutile.  
   General: Baskerville, 08; Hulst, 05; Snelling, 02; Watson (T L), 17b  
   United States: Bruce, 14c  
   Virginia: Hess, 10e; Watson, 10c, 13g  
 Titanotherium. *See* Mammalia.  
 Titanotherium beds: Hatcher, 93a  
 Tobago.  
   *Historical geology.*  
   General: Craig, 07  
   *Paleontology.*  
   General: Guppy, 03  
   Mollusca: Guppy, 04d  
 Tobique district, N. B.: Young (G A), 11  
 Tolchester folio, Md. (no. 204): Miller (B L), 17  
 Tolovana district, Alaska: Brooks (A H), 16; Mertie, 17  
 Tombolas, Nantucket, Mass.: Gulliver, 09, 10a  
 Tombstone district, Ariz.: Blake (W P), 82; Church, 82, 03; Shaw (S F), 09  
 Tomichi district, Colo: Crawford (R D), 13  
 Tongue, new stratigraphic term: Stephenson, 17  
 Tonopah district, Nev.: Balliet, 14; Burgess, 09; Locke, 11; Rice (C T), 06, 06a; Spurr, 05  
 Topaz.  
   General: Eakle, 98  
   Maine: Bastin, 11  
   Mexico: Wittich, 12d  
   New Brunswick: Brock, 11c  
   Ontario: Miller (W G), 11  
 Topographic maps, interpretation: Salisbury, 08a  
 Topography, relations of geology to: Branner, 98  
 Torbrook iron district, N. S.: Parsons (W F C), 06  
 Tornoceras: Beecher, 90  
 Toronto interglacial period, duration: Coleman, 02f  
 Torosaurus: Marsh, 92  
 Torreya, mid-Cretaceous species: Berry, 08



Tortugas atoll: Vaughan, 14a

**Tourmaline.**

California, San Diego Co.: Cowan, 10

Composition: Kunz, 02b

General: Hamlin, 73; Spotswood, 11

Maine: Bastin, 11; Hamlin, 73; Wade, 09

Tourmaline zones, Alexandria Bay, N. Y.: Smyth (C H), 02

Tower quadrangle, N. Dak.: Willard, 06a, f

Toxochelys: Wieland, 02, 05

Toxodontia: Cope, 97c

Trachodon: Brown (B), 08b; Gilmore, 15c; Osborn, 09b, d, 12d

**Tracks and trails.**

Cincinnatian: Miller (S A), 80

Climactichnites: Woodworth, 03a

Del Rio clay, Tex.: Udden, 08

Gyrichnites, Gaspé: Whiteaves, 83a

Massachusetts, Triassic: Hitchcock (C H), 66

New Jersey, Triassic: Gratacap, 86

New York, Clinton sandstones: Hall, 50a; Potsdam sandstone: Ferrier, 83; Hall, 89b

Pennsylvania, York Co., Triassic: Wanner, 89, 92

Protichnites and Climactichnites: Chapman (E J), 77

Wisconsin, Potsdam sandstone: Todd, 82

Worm (?) burrows, Chemung rocks: Whitfield, 04b

Trail Creek coal field, Mont.: Calvert, 12a

Transmission of heat into earth: Lane, 05c

Transportation of débris by running water: Gilbert, 14

Transporting agencies: Salisbury, 95a

**Trap.**

Atlantic region: Hawes, 82

Connecticut, Triassic: Davis (W M), 98

General: Jackson, 56e

Georgia: McCallie, 01

New Jersey: Nason, 89

Hudson Co.: Russell, 80a

northern: Darton, 90

New York: Newland, 16

Trap-rock minerals, origin: Lewis (J V), 15a

Trap sheets, Lake Nipigon basin: Wilson (A W G), 09; New Jersey: Russell, 78

Trapa: Berry, 14c

Trask, J. B., biography: Stearns, 08; Vogdes, 07

Traverse group, Michigan: Grabau, 02a

**Travertine.**

California, Salton Sink: Jones (J C), 13b

Oklahoma: Emig, 17; Arbuckle Mountains: Emig, 18

Travertine and siliceous sinter: Weed, 89

Travertine falls and reefs, origin: Branner, 01a

Treasure Mountain, Colo.: Purington, 08

Tremataspidae: Patten, 02

Trematops: Williston, 09b

Trenton folio, N. J.-Pa. (no. 167): Bascom, 09b

Trenton rocks, original: White (T G), 96a

Tres Hermanas district, N. Mex.: Lindgren, 09

Tres Marias: Grayson, 72

Tranisites cliffordi: Rafinesque, 21

Triassic. *See also* Paleontology, Triassic.

Alaska: Brooks (A H), 07; Martin (G C), 12, 16

Alaska Peninsula: Atwood, 11; and Cook Inlet: Stanton, 05c

**Triassic—Continued.**

Alaska: Cape Thompson: Kindle, 09c

Chitina Valley: Moffit, 16, 18

Clark Lake region: Martin (G C), 10

Copper River region: Mendenhall, 05; Schrader, 01

Gravina Island: Chapin, 18a; Smith (P S), 15

Gulkana-Susitna region: Moffit, 12

Iliamna region: Martin (G C), 10, 12a

Kenai Peninsula: Martin (G C), 15

Kotsina-Chitina region: Moffit, 09b

Mount McKinley region: Brooks (A H), 11

Nelchina-Susitna region: Chapin, 18

Nizina district: Moffit, 11a

Noatak-Kobuk region: Smith (P S), 13a

Porcupine to Arctic boundary: Maddren, 12a

Revillagigedo Island: Chapin, 18a

southeastern: Atwood, 12

upper Yukon region: Brooks (A H), 08a

Alberta, Bighorn coal basin: Malloch, 11

Peace River section: McLearn, 18

Roche Miette area: Dowling, 12

Appalachians: Keith, 94a

Arctic regions, Ellesmere and Grinnell lands: Høltedahl, 17

Arizona: Blake (W P), 01a

Grand Canyon: Dutton, 82, 82a

Little Colorado Valley: Gregory (H E), 14; Ward (L F), 01

Navajo country: Gregory (H E), 17

northern: Darton, 10a

southeastern: Dumble, 02

Atlantic Coastal Plain: Kerr, 75a; Lyman, 94a

Atlantic region: Frazer, 79b; Russell, 80

Bragdon formation, California: Hershey, 04

British Columbia: Dawson (G M), 83b

coast region: Bancroft (J A), 13

Flathead area: MacKenzie, 16a

Golden-Kamloops: Daly (R A), 15

Graham Islands: Clapp (C H), 14a

Kamloops area: Dawson (G M), 95

New Westminster and Nanaimo districts: LeRoy, 08

northern: Whiteaves, 77

Prince Rupert-Aldermere: McConnell, 14a

Queen Charlotte Islands: Dawson (G M), 80

Rosslund: Bruce, 17a

Savona area: Rose, 14

Skeena River district: McConnell, 13

Texada Island: McConnell, 14

Tulameen district: Camsell, 10, 13

Vancouver area: Burwash, 18

Vancouver Island: Clapp (C H), 12

Duncan area: Clapp (C H), 14d

northern part: Dawson (G M), 87

southern part: Clapp (C H), 14b

Ymir area, West Kootenay district: Drysdale, 17

California: Smith (J P), 98, 07, 10, 16

Bully Hill district: Boyle, 14

eastern: Spurr, 03

Inyo and White Mountains: Knopf, 14a

Inyo Range: Kirk, 18

Lassen Peak quadrangle: Diller, 95

Redding quadrangle: Diller, 06

Shasta Co.: Fairbanks, 94e; Smith (J P), 94a, 95b



## Triassic—Continued.

- California: Sierra Nevada: Smith (J P), 94b; Turner, 94a, 96  
 Taylorville region: Diller, 92, 08b; Hyatt, 92  
 Canada: Ami, 00a, 01h; Dowling, 09  
 maritime provinces: Matthew (G F), 08a  
 Rocky Mountain region: Dawson (G M), 01  
 Catoclin belt: Keith, 94a  
 Classification: Smith (J P), 96a  
 Coastal Plain, Maryland and Virginia: Darton, 91b  
 Colorado: Marvine, 74  
 Aspen district: Spurr, 98  
 Arkansas Valley: Darton, 06f  
 Boulder district: Fenneman, 05b  
 Canon City: Hatcher, 01d  
 central: Peale, 75  
 Denver Basin: Emmons (S F), 96  
 Denver region: Cannon, 95b; Eldridge, 89, 90  
 Elk Mountains: Holmes (W H), 76  
 Engineer Mountain quadrangle: Cross, 10  
 Front Range: Hallowell, 82a; Hayden, 76  
 Grand River district: Peale, 77  
 Hahns Peak region, Routt C.: George (R D), 09c  
 north central: Henderson (J), 09  
 northern: Ziegler, 17b  
 North Park: Beekly, 15  
 northwestern: Gale, 10; White (C A), 78d  
 Ouray quadrangle: Cross, 07a  
 Perry Park: Cannon, 91a; Kruger, 10  
 red beds: Cross, 05c  
 Rico Mountains: Cross, 00  
 Rico quadrangle: Cross, 05a  
 Rocky Mountain front range: Darton, 04c  
 Rocky Mountains: Hills 91c  
 San Miguel: Hills, 80  
 southern: Stevenson, 75  
 southwestern: Cross, 14a; Hills, 82  
 western: Cross, 07  
 Connecticut: Dana (J D), 91d; Davis (W M), 82b, 89d, 94, 98; Gregory (H E), 09a; Lull, 12b; Percival, 42; Rice (W N), 06a; Schuchert, 08  
 East Haven-Branford region: Hovey, 89  
 fossiliferous black shale: Davis (W M), 91  
 Meriden: Davis (W M), 89a, 96a  
 New Haven region: Dana (J D), 92a  
 Pomperaug Valley, Newark: Hobbs, 00b, 01  
 sandstone group: Hitchcock (C H), 95  
 Connecticut Valley: Davis (W M), 83b, 86a, d, 88, 91e; Emerson, 96a; Hitchcock (E), 47a, 54; Lull, 15; Pynchon, 05; Redfield, 51; Rogers (H D), 54b; Russell, 78b; trap sheets: Davis (W M), 89b  
 Coral reefs: Smith (J P), 12a  
 Cordilleran region: King (C), 78a; Lindgren, 15a; forty-ninth parallel: Daly (R A), 13  
 Correlation: Smith (J P), 96a, 98  
 Deep River coal field: Emmons (E), 56  
 Eastern North America: Dana (J D), 83a; Walling, 79a  
 General: Broadhead, 83; Cope, 87c; Emmons (E), 54; Marcou, 59; Merriam (J C), 08; Miller (S A), 81; Newberry, 85i; Smith (J P), 02; Wheatley 61; White (C A), 89b; Wiman, 16

## Triassic—Continued.

- Great Plains: Darton, 05; White (C A), 82  
 Greenland: Böggild, 17; Nordenskjöld, 09  
 Hallopus beds: Williston, 05  
 Idaho, Fort Hall Indian Reservation: Mansfield (G R), 16b  
 phosphate reserve: Richards (R W), 11b  
 southeastern: Peale, 79a; Richards (R W), 14a; Schultz, 13, 18  
 Kansas: Hay (R), 89b; Hawn, 58; Swallow, 58d  
 southwestern: Hay (R), 90  
 Marine, western America: Smith (J P), 04a  
 Maryland: Clark (W B), 06c  
 Harpers Ferry quadrangle: Keith, 94  
 Massachusetts: Davis (W M), 82b; Emerson (B K), 91, 17; Hitchcock (E), 33, 41  
 Hampshire area: Emerson (B K), 95b, 98  
 Holyoke quadrangle: Emerson (B K), 98a  
 Mesozoic floras of North and South America: Knowlton, 18  
 Mexico: Burckhardt, 06d  
 Chiapas and Tabasco: Böse, 05  
 northern: Rémond, 66  
 Sonora: Dumble, 00, 00a  
 Zacatecas: Amador, 08  
 Montana, Big Horn Mountains: Darton, 06e  
 Lewis and Livingston ranges: Willis, 02  
 southwestern: Condit, 18  
 Nevada: Smith (J P), 07  
 Rochester district: Schrader, 14c  
 Yerington district: Knopf, 18a  
 Newark series: Gilbert, 94; Hobbs, 02; Kümmel, 97, 97a, 98, 99, 99b; Lea, 58; Lyman, 94b; Powers, 16; Russell (I C), 89c, 91b, 92, 95b  
 age: Redfield (W C), 56  
 Atlantic region: Lebling, 14  
 New Jersey: Kümmel, 97a  
 Philadelphia district, terrestrial origin: Morningstar, 16  
 position: Frazer, 77a  
 New Brunswick: Powers, 15d, 16  
 southern: Bailey (L W), 65, 72, 80  
 volcanic rocks: Bailey (L W), 05a  
 New Jersey: Cook (G H), 68, 79, 82, 89; Darton, 89a; Davis (W M), 82b; Kümmel, 99b, 09; Lewis (J V), 07a-c, 15; Mawby, 94; Nason, 89, 89b; Redfield, 51; Russell, 78b  
 Hudson Co.: Russell, 80a  
 Lockatong formation: Hawkins, 14  
 Newark system: Kümmel, 97, 97a, 98, 99, 99b  
 Palisade Range: Dana (J D), 71g  
 Passaic quadrangle: Darton, 08b  
 Raritan quadrangle: Bayley, 14  
 Sand Hills region: Clark (W B), 97e  
 trap sheets: Russell, 78  
 Trenton quadrangle: Bascom, 09b  
 Watchung basalt: Fenner, 10b  
 New Mexico: Huene, 11; Keyes, 05d; Marcou, 89f  
 Deming quadrangle: Darton, 17  
 Luna Co.: Darton, 16  
 Navajo country: Gregory (H E), 17  
 northern: Williston, 12c  
 northwestern: Dutton, 85  
 red beds: Case, 14



## Triassic—Continued.

- New York: Kummel, 99b  
 Richmond Co.: Britton (N L), 81a  
 Rockland Co.: Kummel, 99a  
 southeastern: Berkey, 11; Mather, 43  
 Staten Island: Hollick, 89a, 06b  
 North America: Willis, 12; southern: Stanton, 18  
 North Carolina: Emmons (E), 58b; Keith, 07b; Kerr, 75  
 Dan River field: Stone (R W), 12a, 14a; Woodworth, 02  
 Deep River coal field: Woodworth, 02  
 Northeastern United States: Davis (W M), 83  
 Nova Scotia: Honeyman, 74; Marsters, 90; Powers, 15d, 16  
 Digby basin: Bailey (L W), 98c  
 Gaspereau Valley: Haycock, 02  
 Kings and Hants cos.: Fletcher, 02  
 New Red Sandstone: Dawson (J W), 48b  
 southwestern: Bailey (L W), 95  
 Oregon, Baker district: Grant (U S), 14  
 Blue Mountains: Lindgren, 01  
 northeastern: Lindgren, 01c  
 Paleogeographic map: Willis, 09  
 Palisades, trap rock: Lyman, 96a  
 Pennsylvania: Lesley, 92; Rogers (H D), 58; Wherry, 12b, 13  
 Berks Co.: D'Invilliers, 83  
 Bucks Co.: Hall (C E), 81; Lesley, 91a; Lyman, 91, 95  
 eastern: Jonas, 17; Lesley, 65; sun-crack structure: Wherry, 12c  
 Gettysburg, igneous: Stose, 16  
 Gwynned: Lea, 57a  
 Lancaster Co.: Frazer, 80  
 Lehigh Co.: Miller (B L), 14  
 Lockatong formation: Hawkins, 14  
 Montgomery Co.: Hall (C E), 81; Lyman, 95  
 Newark series: Wherry, 08a, 12c  
 Philadelphia district: Bascom, 04, 09a  
 southeastern: Carter (O C S), 91; Fraser, 82; Lyman, 94a  
 South Mountain: Eaton (H N), 12  
 Trenton quadrangle: Bascom, 09b  
 York Co.: Fraser, 75e, 86a  
 Plant-bearing beds: Ward (L F), 92  
 Prince Edward Island: Bain (F), 85, 85b; Dawson (J W), 55, 71, 72b; Ells, 85  
 Red beds: Case, 17b  
 age and origin, southeastern Wyo.: Knight (S H), 17a  
 Laramie Plains: Knight (W C), 02c  
 Shinarump conglomerate: Gregory (H E), 13  
 Shinarump group, Utah: Lawson, 13a  
 South Carolina: Sloan, 08  
 South Dakota: Darton, 09a; Todd, 95, 98  
 Black Hills: Carpenter (F R), 88; Darton, 01a, 04c, 09, 18; Newton, 80; Stone (R W), 12  
 Belle Fourche quadrangle: Darton, 09e  
 Edgemont quadrangle: Darton, 04a  
 Spearfish formation, Black Hills: Richardson (G B), 03  
 Texas: Sternberg, 83a; Udden, 16a  
 Concho country: Lerch, 91  
 Double Mountains: Dumble, 92d  
 Llano Estacado, northern: Baker (C L), 15

## Triassic—Continued.

- Texas: northwestern: Drake, 92; Marcou, 92a  
 Panhandle: Gould, 06, 07  
 red beds: Case, 14  
 Utah: Meek, 60a  
 Castle Valley: Lupton, 16a  
 eastern: Cross, 07  
 Green River desert: Emery, 18a  
 high plateaus: Dutton, 80  
 northeastern: White (C A), 89  
 Park City district: Boutwell, 12  
 San Francisco district: Butler (B S), 12  
 San Juan oil field: Woodruff, 12  
 Uinta Range: Weeks, 07  
 Virginia: Emmons (E), 58b; Fontaine, 79  
 Harpers Ferry quadrangle: Keith, 94  
 James River basin: Lyell, 47; Taber (S), 13  
 Richmond Basin: Berry, 12e; Knowlton, 99a; Shaler, 99a; Woodworth, 02  
 Virgilina district: Laney, 17  
 Western States: White (C A), 79f  
 Wyoming: Darton, 08  
 Aladdin quadrangle: Darton, 05b  
 Bald Mountain and Dayton quadrangles: Darton, 06c  
 Big Horn Basin: Fisher (C A), 06; Hewett, 17  
 Big Horn Mountains: Darton, 04c, 06e; Lupton, 16b  
 Black Hills region: Darton, 09; Stone (R W), 12  
 central: Hares, 16  
 Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
 Devils Tower quadrangle: Darton, 07b  
 Douglas oil field, Converse Co.: Barnett, 14; Jamison, 12  
 Embar and Chugwater formations: Condit, 16  
 Fremont Co.: Jamison, 11a  
 Green River district: Peale, 79  
 Hartville quadrangle: Smith (W S T), 03  
 Lander oil field: Woodruff, 11  
 Laramie Basin: Darton, 09f; Slosson, 00  
 Laramie and Sherman quadrangles: Darton, 10c  
 Lincoln Co.: Schultz, 14  
 Newcastle quadrangle: Darton, 04  
 North Laramie Mountains: Spencer (A C), 16a  
 northwestern: Eldridge, 94a  
 Salt River Range: Mansfield, 16a  
 Sundance quadrangle: Darton, 05a  
 Sweetwater district: Endlich, 79  
 western: Comstock, 74; Condit, 18; Peale, 79a; Schultz, 18  
 Wind River Range: Endlich, 79  
 Yellowstone and Missouri rivers: Hayden, 69a  
 Yukon, Porcupine to Arctic boundary: Maddren, 12a  
 Triassic cephalopod genera: Hyatt, 05  
 Tribes Hill formation: Raymond (P E), 10d  
 Triceratops. *See* Reptilia.  
 Tridymite, melting point: Ferguson (J B), 18  
 Trilobites. *See also* Crustacea.  
 Acadian: Matthew (G F), 84a  
 Acidaspis: Clarke (J M), 91a; Vogdes, 77; Marcellus shale: Hitchcock (C H), 03  
 Aeonina, Bedford Co., Pa.: Haldeman, 47



**Trilobites—Continued.**

- Agnostus: Vogdes, 92  
 Ambulatory appendages: Woodward, 71a  
 Ampyx: Vogdes, 93b  
 Anatomy: Walcott, 81  
 Antennae: Beecher, 96b  
 Appendages: Kemp, 93h; Six, 84; Valiant, 01; Walcott, 76a, 84e, 94b, 17  
 Asaphidae: Raymond (P E), 12a  
   Beekmantown: Raymond (P E), 10  
   Canada: Raymond (P E), 13f  
 Asaphus, Missouri: Green (J), 38b  
   Moose River: Honeyman, 88d  
   Nova Scotia: Green (J), 34a  
   Ontario: Chapman (E J), 58a, 59  
   Ohio: Green (J), 39  
   Pennsylvania: Green (J), 37  
   Perry Co., Tenn.: Troost, 38  
   St. Joseph's Island, Ont.: Stokes, 24  
   structural features: Woodward (H), 70  
 Asaphus canadensis: Chapman (E J), 56a  
 Asaphus canalis: Whitfield, 89a  
 Asaphus latimarginatus: Chapman (E J), 57  
 Asaphus megistos, Cobourg, Ont.: Chapman (E J), 59a  
 Asaphus myrmecoides: Green (J), 33  
 Atops and Triarthrus: Haldeman, 47a; Hall, 48c  
 Atops trilineatus: Ford (S W), 80; and Triarthrus beckii: Emmons (E), 49  
 Auburn chert fauna, Missouri: Branson, 09  
 Bathyrus: Raymond (P E), 13h  
 Bibliography, Paleozoic: Vogdes, 17  
 Black River, Ottawa: Raymond (P E), 08b  
 Bohemillidae: Beecher, 96c  
 British Columbia, Cambrian: Walcott, 10  
   Mount Bosworth, middle Cambrian: Burling, 16c  
   Mount Noyes: Woodward (H), 03  
   Mount Stephen: Rominger, 87a; Cambrian: Matthew (G F), 99  
 Bronteus, Chemung, New York: Clarke (J M), 89a  
 Calymene, Georgia: Vogdes, 80  
   New York: Green (J), 38  
   Ohio: Anthony, 39a; Green (J), 37  
 Calymene bufo, inferior surface: Green (J), 40  
 Calymene nasuta, Osgood, Indiana: Ulrich, 79b  
 Cambrian: Salter, 59a; Walcott, 08b, 14, 16a  
   Alberta: Walcott, 10  
   Mount Stephen, B. C.: Rominger, 83; Woodward (H), 02  
   New Brunswick: Matthew (G F), 88c, 06b  
   Troy, N. Y.: Ford (S W), 81a  
 Canadian: Raymond (P E), 13e  
 Carboniferous: Vogdes, 88  
 Ceratocephala: Vogdes, 77; Ohio: Anthony, 38; Warder, 38  
 Ceraurus: Barton, 13  
 Ceraurus, Chazy group, New York: Raymond (P E), 16c  
   revision: Raymond (P E), 13l  
 Ceraurus crosotus, Cincinnati: Locke, 43b, c  
 Ceraurus pleurexanthemus, Trenton Falls: Walcott, 76b, c  
 Chazy limestone: Raymond (P E), 05, 10b  
   nomenclature: Raymond (P E), 05a

**Trilobites—Continued.**

- Chazy limestone: Ontario: Raymond (P E), 10e  
   Vermont: Raymond (P E), 10f  
 Cheirurinae, revision: Barton, 15  
 Cincinnati: Foerste, 09c; Miller (S A), 74b  
 Classification: Beecher, 97a; Chapman (E J), 87, 90; Raymond (P E), 17; and characters: Chapman (E J), 56  
 Conocephalites: Bradley, 60  
 Cordania: Clarke (J M), 92c  
 Coronura aspectans: Clarke (J M), 91b  
 Cryphaeus: Green (J), 37b  
 Cryptolithus, cephalic suture lines: Ruedemann, 16c  
 Cryptolithus versus Trinucleus: Raymond (P E), 13a  
 Cryptolithus tessellatus, Cincinnati: Locke, 42  
 Cryptonymus: Vogdes, 78  
 Cybele: Narraway, 06  
 Dalmanites, Cuyahoga shale, Ohio: Claypole, 84f  
   Littleton, N. H.: Lambert, 05  
   Mississippian: Claypole, 84i  
   New York: Barrett, 76  
 Dalmanites lunatus: Lambert, 04  
 Descriptions: Owen (D D), 52a; new species: Green (J), 34  
 Development of first trilobites: Matthew (G F), 89d  
 Devonian: Rowley, 06; Illinois: Savage, 13b  
 Dikelocephalinae, Cambrian: Walcott, 10  
 Eggs: Walcott, 79a  
 Embryonic forms, Primordial, Troy, N. Y.: Ford (S W), 77a, 81a  
 Encrinurus: Vogdes, 07a; nodal variation: Norton, 96a  
 Encrinurus americanus, Clinton group, Georgia: Vogdes, 86  
 General: Eaton (A), 32b; Green (J), 32, 39; Vogdes, 76  
 Georgia: Salter, 59a; Clinton group: Vogdes, 86a  
 Griffithides, Coal Measures, Arkansas: Vogdes, 95a  
 Harpes, Trenton, Ottawa, Ont.: Billings, 63b  
 Homalonotus, Oriskany, New York: Whitfield, 85c  
 Homalonotus and Dipleura: Roemer, 53b  
 Homalonotus (v.-m.) perceensis, Percé, Quebec: Clarke (J M), 13b  
 Illaenidae: Raymond (P E), 16a  
 Illaenus, Minnesota: Foerste, 87a  
 Injury to eye: Walcott, 83b  
 Iowa, Fayette Co., Maquoketa beds: Slocum, 16  
 Isotelus, New York: Dekay, 24a; Ohio: Locke, 38  
 Isotelus gigas, ontogeny: Raymond (P E), 14  
 Isotelus maximus, Cincinnati: Locke, 41  
 Isotelus megistos, Cincinnati: Locke, 42a  
 Larval stages: Beecher, 95  
 Leg structure: Jaekel, 02  
 Legs, supposed: Dana (J D), 71c, 72c  
 Leptoplastus: Matthew (G F), 91c; Cambrian, New Brunswick: Matthew (G F), 89a  
 Lichas, Ordovician: Ulrich, 92c  
 Lichas grandis, hypostome: Whitfield, 97  
 Locomotion: Ringueberg, 87



## Trilobites—Continued.

- Locomotory appendages: Mickleborough, 83; Woodward (H), 84
- Lower Cambrian: Burling, 17b
- Lower Helderberg, larval forms: Beecher, 93c
- Lowville and Black River formations: Raymond (P E), 10a
- Maryland, Devonian: Clarke (J M), 13e; Ohern, 13b; Prosser, 13c
- Massachusetts, Boston Basin, Cambrian: Grabau, 00a
- Braintree: Barrande, 60; Lea, 57b; Rogers (W B), 57a
- Median eye: Ruedemann, 16, 16d
- Menocephalus salteri, Quebec group: Devine, 63a
- Mesonacidae: Burling, 16b; rudimentary posterior segments: Burling, 16e
- Mesonacis, Vermont: Walcott, 85a
- Metadoxides, Cambrian: Matthew (G F), 99c
- Microdiscus: Ford (S W), 77; Cambrian: Matthew (G F), 96b
- Minnesota, Bathyrurus: Vogdes, 84
- Missouri: Rowley, 08; Shumard (B F), 55
- Kansas City: Hare, 91
- Sedalia: Vogdes, 88a, 92a
- Moorefield shale fauna: Girty, 11
- Mount Whyte fauna: Walcott, 17
- New Brunswick, St. John group: Matthew (G F), 93b
- Newfoundland: Salter, 59a
- New Jersey, Cambrian: Weller, 00a
- New species, Pennsylvania, descriptions: Green (J), 37a
- New York: Dekay, 24a
- Devonian: Hall, 62b, 88
- Potsdam sandstone: Billings, 60a; Bradley, 60
- Niagaran, Chicago area: Weller, 07a
- Nileus vigilans, Elgin, Iowa, habits: Finch (G E), 04
- Nomenclature: Raymond (P E), 13
- Nova Scotia, Annapolis Co., Asaphus: Honeyman, 79
- Odontopleuridae: Raymond (P E), 16d
- Ohio, Montgomery Co.: Taylor (J S), 50
- Olenellus, York Co., Pa.: Wanner, 01
- Olenellus and other Mesonacidae: Walcott, 08a
- Olenellus asaphoides, development: Ford (S W), 78b
- Olenopsis, Cambrian: Walcott, 10
- Olenus? logani, Quebec group: Devine, 63
- Olenus (Olenellus) gilberti: Meek, 75a
- Ontario, Ordovician: Billings, 59d; Ottawa: Narraway, 12
- Ordovician: Billings, 70; Walcott, 79b, 10
- Indiana: Bigney, 11
- Maquoketa beds, Iowa: Slocum, 13
- Minnesota: Clarke (J M), 97b
- Trenton, Wisconsin: Blake (W P), 94
- Oryctocephalus reynoldsi, Mount Stephen, British Columbia: Reed (F R C), 99
- Paedcumias: Burling, 16b
- Paradoxides: Green (J), 38; Hall, 37a; Matthew (G F), 85c
- eastern Massachusetts: Rogers (W B), 56d,e
- Newfoundland and Massachusetts: Jackson, 59g

## Trilobites—Continued.

- Paradoxides: ontogeny: Raymond (P E), 14
- St. John: Matthew (G F), 87e
- Paradoxides beds faunas: Matthew (G F), 96a
- Paradoxides harlani, Braintree, Mass.: Ordway, 61
- Paradoxides (Olenellus?) kjerulfi: Matthew (G F), 87f
- Paradoxus, Lockport, N. Y.: Bigsby, 25a
- Pennsylvania, Huntingdon Co.: Green (J), 37b; Walpack Ridge: Heilprin, 84d
- Phacopidae: McLearn, 18b
- Phacops rana, visual area: Clarke (J M), 88a
- Phillipsia, Carboniferous, Nova Scotia: Billings, 63e; How, 63a
- Plethopeltis: Field, 15
- Prestwichia: Beecher, 02
- Protolenus: Matthew (G F), 04a; St. John group: Matthew (G F), 92b
- Proetus, Chouteau limestone, Mo.: Vogdes, 97
- Greenwood Co., Kans.: Williams (H S), 81a
- Pulaski Co., Ky.: Wetherby, 81a
- Relation to the strand line: Clarke (J M), 11d
- Remopleurides, Trenton Falls, N. Y.: Walcott, 75a
- St. John group, New Brunswick: Matthew (G F), 83, 85, 86, 87b,c, 98a
- Salem limestone, Indiana: Cumings, 06a
- Silurian, Batesville, Ark.: Van Ingen, 01
- Indiana, Ohio, and Kentucky: Foerste, 09
- Solenopleura, New York: Ford (S W), 78
- Spheroecoryphe, Trenton Falls, N. Y.: Walcott, 75
- Strenuella strenua, Cambrian, Braintree, Mass.: Shimer, 07, 07a
- Structure: Dekay, 24a; Walcott, 79
- Structural features: Billings, 70
- Systematic position: Beecher, 97; Kingsley, 97; Packard (A S), 98b
- Tennessee, Ordovician: Safford, 89b
- Terataspis grandis: Clarke (J M), 91c
- Thaleops, Wisconsin: Conrad, 43b
- Triarthrus: Green (J), 38
- appendages: Beecher, 94a
- legs: Beecher, 93e
- morphology: Beecher, 96
- Utica, New York: Harlan, 35b
- ventral structure: Beecher, 95
- Whitby, Ont.: Smith (J F jr), 61
- Triarthrus becki: Beecher, 94, 02a
- appendages: Matthew (W D), 93a
- larval form: Beecher, 93d
- Triarthrus spinosus: Ami, 83
- Trinucleus, structure and appendages: Beecher, 95
- Trinucleus concentricus: Chapman (E J), 57d
- Ventral integument: Beecher, 02a
- Vermont, Cambrian: Hall, 59g, 60d
- Conocephalus: Hall, 47a
- Georgia: Hall, 59k
- Wisconsin, Cambrian: Shumard (B F), 63
- Potsdam: Bradley, 61
- Silurian: Raymond (P E), 16a
- Zethus, Cybele, Encrinurus, and Cryptonomus: Vogdes, 78
- Zoological position: Bernard, 95
- Trimerorhachis: Williston, 15



Trinacromerum: Cragin, 91b; Williston, 08b

**Trinidad.**

Cacao soils: Craig, 05a

General: Bowen (H G), 56; Guppy, 05, 11, 12; Montserrat, 67; Wall, 57

Geologic history: Guppy, 02

Geologic structure: Craig, 07d; Ells, 07, 07a

Geologist's report: Craig, 05d, 06c

Metamorphic rocks: Craig, 07b

*Economic geology.*

Asphalt: Cronise, 94; Manross, 55; Morton, 66; Nugent, 11; Richardson (C), 17; Wall, 60

Bitumen: Cumenge, 82

Cement materials: Carmody, 05; Naparima: Guppy, 08a

Coal fields: Catherall, 13; Guppy, 77a, 02; Cunapo field: Cadman, 05

General: Wall, 57, 60

Gold: Guppy, 02

Lignite: Cumenge, 82

Manjak: Guppy, 04b

Marbela: Guppy, 08

San Fernando field: Craig, 06b

Mineral resources: Cadman, 08; Ells, 07, 07a

Petroleum: Cadman, 15; Craig, 05c, 06e, 07a, c; Ells, 11; Anon, 10a

Cedros district: Craig, 06

district east of Erin: Craig, 06d

Guapo and La Brea district: Craig, 06a

Mayaro-Guayaguayare field: Craig, 05b

Pitch Lake: Crosby, 79c; Peckham, 95b, 96

San Fernando manjak field: Craig, 05

*Historical geology.*

Caribbean series: Guppy, 70, 77

Caroni series, Savaneta: Guppy, 12b

General: Bowen (H G), 56; Crosby, 79; Duncan, 63; Guppy, 93, 13; Sainte-Clair Deville, 40; Spencer (J W), 02a; Wall, 60, 60a

Kainozoic: Guppy, 67

Marbela district: Guppy, 04b, 09a

Naparima beds: Guppy, 98a, 00

Oceanic deposits: Harrison (J B), 99

Older Parian: Guppy, 63, 63a

Older rocks: Guppy, 77

Polycystina beds, South Naparima: Guppy, 90

Sangregrande boring: Guppy, 04

Tertiary: Douvillé, 17; Guppy, 64, 92; Matura: Guppy, 65

*Paleontology.*

Caribbean series: Guppy, 70

Caroni series, Savaneta: Guppy, 12c

Didymotis trinidadensis, Lower Cretaceous; Sommermeier, 18

Eocene, Mollusca: Maury, 12

Naparima: Guppy, 98

Fish, Laventille Hills: Guppy, 79a

Foraminifera: Guppy, 94, 95, 98a, b

Naparima: Guppy, 04a

San Fernando: Guppy, 72

Tertiary: Guppy, 64; Jones (T R), 66

Fossil shells from Comparo Road: Guppy, 08

General: Etheridge, 60

Komuto shell bed: Guppy, 04c

Microzoa: Guppy, 93

Older rocks: Guppy, 77

Orbitoides: Douvillé, 15, 17

**Trinidad—Continued.**

*Paleontology—Continued.*

Plantae: Crüger, 60

Ranina, Tertiary: Woodward (H), 66

Sangregrande boring: Guppy, 04

Springvale fossils: Guppy, 10, 11a

Tamana district: Guppy, 09

Tertiary: Guppy, 67, 13

Brachiopoda: Guppy, 66

Matura: Guppy, 65

*Petrology.*

Microstructure of rocks: Gregory (J W), 92a

*Physical geology.*

Earthquake: Anderson (R), 11a

Gas volcano: Anderson (R), 11b

New Island, formation of: Anderson (R), 12a; Arnold, 12; Bosworth, 12

*Physiographic geology.*

General: Crosby, 79

Trinidad district, Colo.: Richardson (G B), 10; Whiteside, 12

Trinity formation: Hill (R T), 88a

Trionyx, Cretaceous, Alberta: Lambe, 02b

**Tripoli.**

Georgia: McCallie, 10

Indiana, Dubois Co.: Gardner (J), 74

Missouri, Seneca district: Hovey, 94d; Plumb, 14; Nelson (G), 09; Siebenthal, 08b

New Brunswick, Fitzgerald Lake: Crosby, 01

Oklahoma: Gould, 08c, d, 10c; Perry, 17; Plumb, 14

Tripyramid Mountain, N. H.: Pirsson, 11a

Tristylotus, Devonian, Hudson Bay slope: Parks, 04a

Triticites: Girty, 04a

Trituberculy: Osborn, 97c

Trochiliscus, Ohio: Karpinskii, 09

Trochocyathus, Cretaceous, New Jersey: Vaughan, 00d

Troost, G., biography: Glenn, 05b

Truckee folio, Cal. (no. 39): Lindgren, 97

Tucson region, Ariz.: Blake (W P), 08c

Tucumcari Mountain, N. Mex.: Cummins, 93a

Tufa, Danville, Ill.: Decker, 12

Tufa deposits, origin: Jones (J C), 14

Tuffs, volcanic: Pirsson, 15a

Tulameen district, B. C.: Camsell, 10; Evans (H F), 06

Tularosa Basin, N. Mex.: Meinzer, 15

Tully limestone: Williams (S G), 87a

Tully limestone and Genesee shale, relationship: Grabau, 17

Tully quadrangle, N. Y.: Clarke (J M), 05c

Tumamoc Hills, Ariz.: Tolman, 09

Tundra, Alaska: Russell, 90

**Tungsten.**

Alaska, Birch Creek district: Johnson (B L), 10

Fairbanks district: Mertie, 17a

Arizona: Blake (W P), 99c; Rubel, 16; Taft, 16

Cochise district: Blake (W P), 98f; Kellogg, 06

Whetstone Mountains: Hess, 09a

Barkerville, B. C.: Atkin, 05a

Bibliography: Hartman, 18

California: Boalich, 18

Inyo Co.: Knopf, 17

Kern Co.: Storms, 16

Randsburg district: Nevius, 16



## Tungsten—Continued.

- California: southern: McDonald (P B), 16  
 Canada: Johnston (R A A), 04; Malcolm, 18  
 Colorado, Boulder Co.: George (R D), 09, 09b;  
     Kirk, 16; Leslie, 16; Tovote, 06a; Wolf, 16  
     Central City quadrangle: Bastin, 17  
     Leadville: Fitch, 16  
 Connecticut: Silliman, 19a; Fairfield Co., wolf-  
     ram ore: Gurlt, 94  
 General: Baskerville, 08; Dickinson, 08;  
     Fleck, 16; Hess, 17; Palache, 17; Rubel, 16;  
     Runner, 18; Steinhart, 14; Surr, 09  
 Geology: Runner, 16  
 Idaho, Mackay region: Umpleby, 17  
 Manitoba, Falcon Lake: De Lury, 18  
 New Brunswick, Burnthill Brook area:  
     Young (G A), 18  
 Nova Scotia: Hills (V G), 12b; Cape Breton:  
     Ross, 99  
 Occurrence: Morris (H C), 12  
 Ores: Anon, 18  
 South Dakota: Runner, 16; Black Hills:  
     Irving, 02  
 United States: George (R D), 09b; U S G S, 83  
 Tuolumne Table Mountain, Cal.: Locke, 12b  
 Tuomey, Michael, biography: Rogers (W B), 57b;  
     Smith (E A), 97  
 Tupalidae: Gregory (W K), 13b  
 Turnagain Arm region, Alaska: Moffit, 06  
 Turnagain-Knik region, Alaska: Capps, 16a  
 Turquoise.  
     Arizona: Platt, 09; Mohave Co.: Frenzel, 98  
     General: Fenderson, 97; Pogue, 15  
     New Brunswick: Walker (T L), 11b  
     New Mexico: Dinsmore, 10b; Cowan, 08; Jones  
         (F A), 09  
     Burro Mountains: Zalinski, 07c, 08a  
     Cerrillos Hills: Johnson (D W), 03  
     Grant Co.: Hidden, 93c  
 Turquoise district, Ariz.: Ransome, 13a  
 Turtles. *See* Reptilia.  
 Tuscaloosa formation: Smith (E A), 92c; Wade, 17a;  
     delta character: Berry, 17d  
 Tylopoda, phylogeny: Scott (W B), 91b  
 Tylosaurus: Marsh, 72h  
 Types, nomenclature: Burling, 12b  
 Tyrannosaurus: Osborn, 05, 06c, 12c; restoration:  
     Osborn, 13  
 Uinta formation: Douglass, 14  
 Uinta Mountains: Berkey, 05a; Emmons (S F), 07;  
     Marsh, 71; Powell, 76a; Weeks, 07;  
     geology: Powell, 76; glaciation: Atwood,  
     07, 09  
 Uintacrinus: Bather, 96; Clark (A H), 11; Martin  
     (H T), 07  
 Uintaite: Claypole, 89b  
 Uintatherium: Osborn, 81  
 Una del Gato coal field, N. Mex.: Campbell (M R),  
     07b  
 Unalaska, Makushin sulphur deposits: Lawton, 09  
 Uncompahgre region, Colo.: Siebenthal, 06  
 Unconformities.  
     Alabama, Cretaceous-Eocene contact: Smith  
         (E A), 10a  
     Alberta, Bow River valley, pre-Cambrian-  
         Cambrian: Walcott, 08a  
     Animikie, Minnesota: Winchell (A), 88a

## Unconformities—Continued.

- Archean-Cambrian, Manitou, Colo.: Crosby,  
     99b  
 Arkansas, northern: Williams (H S), 99a  
 Bedford-Berea: Burroughs, 14  
 Berea grit, base: Cushing, 15  
 California, Cretaceous-Tertiary: Stanton, 96;  
     Taylorville region: Diller, 92  
 Cambrian-pre-Cambrian: Walcott, 14  
 Canada, Archean-Paleozoic: Lawson, 90a  
 Carboniferous, Mississippi Valley: Keyes, 01a  
 Carboniferous-Devonian, upper Mississippi Val-  
     ley: Keyes, 92c, 13e  
 Chattanooga shale, base in Kentucky: Kindle,  
     12a  
 Cliff erosion, effect on form of contact surfaces:  
     Fenneman, 05c  
 Coal Measures, base, Iowa: White (C A), 68c  
 Colorado, Archean granite - Wyoming sand-  
     stone: Fenneman, 05c  
 Colorado, northern, foothills structure: Ziegler,  
     17c  
 Cretaceous, base, New Mexico: Keyes, 04b  
 Cretaceous-Eocene boundary, Atlantic Coastal  
     Plain: Clark (W B), 03  
 Cretaceous-Eocene contact, Atlantic and Gulf  
     Coastal Plain: Stephenson, 14b, 15  
 Cretaceous-Tertiary boundary: Lee (W T), 17;  
     Matthew (W D), 14; Mexico, northeastern:  
     Dumble, 15b; Rocky Mountain region:  
     Delafontaine, 76  
 Devonian: Keyes, 02h; Ontario, glauconitic:  
     Andrée, 14  
 Dip of marine limestone strata: Mather, 18  
 Dynamic relations and terminology: Crosby, 12  
 Ep-Archean formation, first: Ami, 03d  
 Erosion intervals in Eocene of Mississippi em-  
     bayment: Berry, 15  
 Erosion intervals in Tertiary of North Carolina  
     and Virginia: Miller (B L), 10  
 General: Chamberlin (R T), 14; Fenneman,  
     05e; Irving, 88; Le Conte, 77; Rogers (H  
     D), 58b; Ulrich, 11a, 16  
 Grenville-Hastings: Miller (W G), 07a, 08  
 Huronian, Michigan: Allen (R C), 14  
 Indiana, Niagara group: Elrod, 02  
 Iowa, Coal Measures-St. Louis: Keyes, 93g;  
     Devonian-Carboniferous: Keyes, 12f  
 Lake Superior region: Van Hise, 91, 11  
 Lance formation: Knowlton, 11a  
 Laramie, Raton Mesa field: Lee (W T), 11  
 Laurentian-Huronian contact, Ontario: Bell  
     (R), 93a  
 Maquoketa formation: Shaw (E W), 11i  
 Massachusetts, Marthas Vineyard: Woodworth,  
     97  
 Michigan, Huronian-granite: Smyth (H L), 93;  
     Little Lake district: Allen (R C), 14  
 Mississippian-Pennsylvanian: Butts, 08; White  
     (D), 04; Ohio: Lamb, 11  
 Missouri, southeastern: Buckley, 09  
 Moencopie-Shinarump: Gregory (H E), 14  
 Narragansett Basin: Loughlin, 14b  
 Nebraska, Platte River: Gould, 00a  
 New Brunswick: Bailey (L W), 85  
 New Mexico, Estancia Plains: Keyes, 08b;  
     Raton field: Lee (W T), 09a, e



**Unconformities—Continued.**

- New York, Rondout: Davis (W M), 83d  
 St. Lawrence River region, pre-Potsdam: Smyth (C H), 01  
 Trenton (base): Cushing, 05  
 North Carolina, Cretaceous-Tertiary: Holmes (J A), 00b  
 Ohio, Bedford-Berea: Burroughs, 11, 13; Prosser, 12  
 Maxville limestone: Morse, 10  
 Mississippian: Lamb, 14  
 Mississippian-Pennsylvanian: Schroyer, 15  
 Onondaga, base: Kindle, 13b  
 Ontario, Archean-post-Archean contact: Willmott, 04a  
 Ordovician-Silurian contact, Indiana: Focrste, 04b  
 Oriskany and subjacent: Rogers (W B), 42d  
 Paleozoic, general: Agassiz (L), 52a; Hunt, 74m  
 Paleozoic-pre-Cambrian, Ontario: Baker (M B), 13  
 Pennsylvania, western: Butts, 08a  
 Pennsylvanian, base of: Hyde, 11  
 Pleistocene-pre-Pleistocene division: Chamberlin (T C), 91  
 Prairie du Chien-St. Peter unconformity: Trowbridge, 17b  
 Pre-Cambrian: Sederholm, 13  
 Pre-Richmond, Mississippi Valley: Weller, 07b  
 Quebec, Gaspé Co.: Clarke (J M), 12a; Paleozoic-Archean: Laflamme, 87a  
 Rock-boring shells, geologic significance: Barrows (A L), 13  
 Rocky Mountain region: Tomlinson, 17  
 Sedimentary overlap, types: Grabau, 07  
 Silurian-Devonian, Ontario: Stauffer, 12; Erie Co., N. Y.: Grabau, 00b; western N. Y.: Grabau, 98c  
 Sub-Cambrian: Leith, 14  
 Sub-Ordovician, eastern Ontario: Ells, 03d  
 Subterranean: Weller, 99a  
 Unconformities in continuous sedimentation: Shattuck, 01a  
 Unconformities in limestone: Bassler, 15b  
 Utah, Uinta Reservation: Berkey, 04a  
 Valuation: Blackwelder, 09  
 Virginia, Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Wisconsin, Lake Superior sandstone and Keeweenaw traps: Grant (U S), 01  
 Wisconsin, Pre-Cambrian: Irving, 74b  
 Undagraph: Klotz, 13a  
 Underground ice in northern Alaska: Stefansson, 10  
 Underground volatile agents: Daly (R A), 17a  
 Underground water (general). *See also* Geysers; Mineral waters; Springs; Thermal waters. *For regional see names of States.*  
 Amount in earth's crust: Greenlee, 96  
 Arid regions: Hill (R T), 92d, 93g  
 Artesian, significance of the term: Fuller, 06a  
 Artesian flow, unusual types: Fuller, 05m  
 Artesian flows, controlling factors of: Fuller (M L), 08  
 Artesian water in crystalline rocks: Smith (G O), 05e  
 Artesian waters of the Atlantic Coastal Plain: Fuller (M L), 09

**Underground water—Continued.**

- Artesian wells: Carter (O C S), 93a; Chamberlin (T C), 85; Smith (E G), 94  
 Assay of mine waters: Lane, 08e  
 Atlantic Coastal Plain: Darton, 95a, 96d  
 Bibliography: Fuller, 05k; Meinzer, 18  
 Blowing wells, Great Plains: Hay (R), 95  
 Brines of oil fields, origin: Reeves, 17a  
 Circulation: Villarello, 10c  
 Connate water in oil and gas sands: Johnson (R H), 15; Shaw (E W), 15a  
 Connate waters of Atlantic coast: Lane, 10d  
 Crystalline rocks, water in: Clapp (F G), 09c  
 Deep-well drilling, 1905: Fuller, 06e; Sandford, 06  
 Diffusion of sodium chloride in Appalachian oil-field waters: Richardson (G B), 17b  
 Domestic water supplies for the farm: Fuller, 12a  
 Effect of earthquakes on deep underground water circulation: Yeandle, 09  
 Evaporation of water at depth by natural gases: Mills (R V A), 17  
 Field assay of mine waters: Lane, 08e  
 Flowing wells on anticlines: Clapp (F G), 10d  
 Fluorescein, use of: Dole, 06; Villarello, 06a  
 Fluoroscope, new: Villarello, 06b  
 Fluctuations of water level in wells on Long Island: Veatch (A C), 06b  
 Fountain and geyser springs: Fuller, 05n  
 Free water in earth's crust: Fuller, 06c  
 Fresh-water springs in the ocean: Hitchcock (C H), 05b  
 General: Bryce, 91; Finch (J W), 04; Frazer, 74b; Fuller, 11; Horton (R E), 05, 15; Imbeaux, 17; Lane, 08g; McGee, 13; Mendenhall, 09, 09c  
 Geologic basis for artesian prediction: Darton, 09c  
 Great Plains: Darton, 05; Hay (R), 90a, 93, 95; Hinton, 90; Meinzer, 14a; artesian wells: White (C A), 82, 82e  
 Ground water: Kemp, 13a  
 Ground-water problems in the West: Mendenhall, 09  
 Ground-water table, lowering of: Cook (W A), 14  
 Highlands region: LaForge, 05  
 High Plains: Johnson (W D), 01  
 Hot springs, origin of heat: Lakes, 05a  
 Hydrogeology: Frazer, 74b  
 Hydrographic work of U. S. Geological Survey: Hollister, 05a  
 Hydrologic work of U. S. Geological Survey: Fuller, 05q, 06f  
 Investigation, present trend of: Kemp, 08d  
 Magmatic origin of vein-forming waters in southeastern Alaska: Spencer (A C), 05c  
 Meteoric, depth of: Kemp, 08d  
 Meteoric and magmatic: Hixon, 08a; Kemp, 08b; Rickard, 08b  
 Mine waters, field assay: Lane (A C), 08e  
 Mine waters and hot springs: Emmons (W H), 13c  
 Mineral springs: Peale, 86, 94; origin: Vanuxem, 43  
 Mineral wells and springs: Clarke (F W), 08



**Underground water—Continued.**

- Mississippi Valley, upper: Mead (D W), 94  
 Movement of ground water: King (F H), 99;  
 Lyman, 00; Slichter, 99, 02; rate of:  
 Slichter, 05  
 Movements of underground water in confined  
 basins: Schultz, 07  
 Northwestern States: Hall (C W), 91d  
 Occurrence: Fuller, 05e  
 Oil-field waters, chlorides in: Washburne, 14a  
 Origin of springs: Dwight (S E), 13  
 Pollution in limestone: Matson, 11  
 Representation on maps of wells and springs:  
 Fuller, 06b  
 Rôle in ore formation: Miller (C W), 11  
 Saline artesian waters of Atlantic Coastal Plain:  
 Sanford, 11  
 Sinking water table, effects on springs: Hopkins  
 (T C), 10a  
 Springs: Hopkins (T C), 94  
 Thermal springs, Virginia: Rogers (W B), 43b;  
 United States: Daubeney, 39a  
 Thermal waters of Yellowstone Park: Hague, 11  
 Underflow, Arkansas Valley: Slichter, 06; South  
 Platte Valley: Slichter, 06a  
 Underground volatile agents: Daly (R A), 17a  
 Underground waters for farm use: Fuller, 10  
 Underground temperatures: Watson, 11b  
 United States: McGee, 13; eastern: Fuller,  
 05a, d; McGee, 94  
 Water analyses: Clarke (F W), 14a  
 Water in crystalline rocks: Ellis (E E), 06  
 Water in veins: Rickard, 03d  
 Water table, oscillations: Emmons (W H), 18a  
 Well-drilling methods: Bowman (I), 11  
 Well waters in granites of New England: Clapp  
 (F G), 11a  
 Wilcox well, McKean Co.: Ashburner, 78b  
 Work of: Shaler, 89e

**Ungava.**

- Prospecting: Murray, 07  
 Trenton rocks, Akpatok Island: Whiteaves, 99a

**Ungulata. See Mammalia.**

- Uniformitarianism in deformation: McGee, 94e  
 Union Pacific Railroad, geology: Kneeland, 74  
 Unionidae, Laramie: Whitfield, 07a  
 United States and Mexican boundary survey:  
 Emory, 57

- Unuk River region, B. C.: Wright (F E), 06  
 Uphantaenia: Dawson (J W), 81b; Whitfield, 81a  
 Upper Missouri: Culbertson, 51  
 Upper Silurian. *See* Silurian.  
 Uranium. *See also* Carnotite.

Bibliography: George (R D), 11

Carnotites, origin: Hess, 14a

Colorado: Fleck, 09, 09a

Boulder Co.: Wood (J R), 10

Central City quadrangle: Bastin, 17

Gilpin Co.: Fleck, 08; Tovote, 06

Rio Blanco Co.: Gale, 07

Routt Co.: Gale, 08a

southern: Fleck, 07

General: Baskerville, 08; Cahen, 08; Dickin-  
 son, 08; Fleck, 16; Moore (R B), 13;  
 Ohly, 00a

Ores in sandstone and shale: Lindgren, 11a

United States: U S G S, 83

**Uranium and geology: Joly, 08**

Useful minerals of the United States: Cross, 83a  
 Smock, 83a; Williams (A), 88

**Utah.**

- Bingham Canyon: Kemp, 02f  
 Colorado River of the West: Powell, 72, 73, 74  
 General: Becker, 85; Blake (W P), 71; Emmons  
 (S F), 93; Hayden, 76e, 77; Peale, 73; Rath,  
 84a, 87b; Stansbury, 52; Talmage, 01  
 Henry Mountains: Gilbert, 77b  
 Marsh gas, near Moab: Woodruff, 12a  
 Natural bridges: Dyar, 04  
 Navajo Reservation: Gregory (H E), 10  
 South central Utah: Talmage, 00a  
 Uinta Mountains: Jones (W A), 72

**Economic geology.**

- Alunite, central Utah: Waggaman, 16; Marys-  
 vale: Butler (B S), 12b; and Beaver:  
 Loughlin, 15  
 Anhydrite as a gangue mineral: Lindgren, 10b  
 Annie Laurie mine, Piute Co.: Lindgren, 06a  
 Antimony in southern Utah: Richardson (G B),  
 08a  
 Asphalt: Stone (G H), 91; Salt Lake basin:  
 Boutwell, 05c  
 Asphalt and rare hydrocarbons: Riter, 13  
 Bear River Range lead and copper deposits:  
 Richards (R W), 11  
 Bingham Canyon: Fenner, 93; MacFarren, 09;  
 physiographic conditions at time of  
 copper enrichment: Atwood, 16  
 Bingham district: Boutwell, 03a, 05b, d, e; Em-  
 mens, 05; Lavagnino, 87  
 Bingham ores, genesis: Boutwell, 05f  
 Bitumen: Denton, 66; Green River: Hayes  
 (A A), 66  
 Camp Floyd district, Tooele Co.: Gemmell,  
 97; Hills, 98; Neill (J W), 96  
 Canyon Range: Loughlin, 14  
 Carnotite deposits: Curran, 13; Howard, 14;  
 Moore (R B), 13  
 Green River: Hess, 13a  
 origin: Hess, 14a  
 southeastern Utah: Kithil, 17  
 Castle Valley: Lupton, 16a  
 Cement materials: Eckel, 13  
 Coal: Daggett, 83; Forrester, 93; Ritter, 06b;  
 Watts (A C), 16  
 Blacktail Mountain field, Wasatch Co.: Lup-  
 ton, 12a  
 Book Cliffs field: Lewis (R S), 14; Richardson  
 (G B), 07a, 09b; Taff, 06b  
 Castle Valley: Lupton, 16a; Palmer (C), 11;  
 Palmer (L A), 11a  
 central Utah: Morton, 77  
 Coalville field: Wegemann, 15  
 Emery Co.: Forrester, 15  
 Green River basin: King (C), 70a  
 Harmony, Colob, and Kanab fields: Rich-  
 ardson (G B), 09a  
 Iron Co. field: Lee (W T), 07a  
 northeastern fields: Gale, 09, 10  
 Lost Creek field, Morgan Co.: Clark (F R),  
 18a  
 Pleasant Valley: Taff, 07a  
 Sanpete Co.: Richardson (G B), 06b



## Utah—Continued.

*Economic geology—Continued.*

- Coal:** southern Utah: Richardson (G B), 09a  
 Sunnyside: Harrington (D), 01  
**Tertiary:** Hodge (J T), 71  
 Thompson, Grand Co.: Clark (F R), 14  
 Uintah Co., Vernal field: Lupton 12  
 Wales, Sanpete Co.: Clark (F R), 14a  
 Weber River: Taff, 06a  
**Coke,** natural, in the Wasatch Plateau: Taff, 06d  
**Copper deposits:** Rose, 11; Weed, 06  
 Bear River Range: Richards (R W), 11  
 Beaver Co., Cactus mine: Emmons (S F), 05b; Lindgren, 10b  
 Beaver River Range, Crowther, 03  
**Bingham district:** Atwood, 16; Beeson, 15; Boutwell, 05e; Brinsmade, 07f, 08c; De Kalb, 09a, b; Ingalls (W R), 07; MacFarlane, 09; Palmer (L A), 11; Zalinski, 08a, b  
**Box Elder Co.:** Higgins, 09a  
**Deep Creek district:** Custer, 17  
**Newhouse:** Jensen, 08  
**Ophir district:** Loughlin, 17  
**Promontory district:** Butler (B S), 16  
**San Francisco district:** Butler (B S), 13  
**Tintic district:** Brinsmade, 08  
**Tooele Co.:** Kemp, 18b  
**Cottonwood districts:** Howard, 16  
**Cottonwood-American Fork region:** Butler (B S), 15  
**Cove Creek sulphur beds:** Lee (W T), 07  
**Daly-Judge mine,** Park City: Gow, 07  
**Deep Creek district:** Custer, 17; Reagan, 17  
**Garnet deposits,** Navajo Reservation: Gregory (H E), 16b  
**Gilsonite:** Weston, 04  
**General:** Becker, 85; Huntley, 85; Murphy, 72; Ochsensus, 82  
**Gold:** Hollister, 87  
 Box Elder Co.: Higgins (W C), 09a  
 Camp Floyd district, Tooele Co.: Hills, 98  
**Mercur mine,** Camp Floyd district: Moeller, 94  
**Deep Creek region:** Blake (W P), 92  
**Golden Century and Susannah mines:** Higgins (W C), 09b  
**Grand Co., La Sal Mountains:** Hill (J M), 13a  
**Mercur district:** Allen (R H), 10b; Maguire, 98; Spurr, 95  
**Paria, in Shinarump clay:** Lawson, 13a  
**Piute Co.:** Higgins, (W C), 09; Lindgren, 06a  
**San Francisco district:** Butler (B S), 13  
**Stateline district:** Anon, 08  
**Tintic district:** Tower, 99  
**Gold Hill area,** Tooele Co.: Kemp, 18b  
**Graphite,** supposed, near Brigham: Gale, 10c  
**Green River oil field,** Wayne Co.: Knight (W C), 12; Peet, 09; Anon, 12e  
**Gypsum:** Boutwell, 04a; Diehl, 04; Talmage, 93  
**Nephi:** Boutwell, 04d  
**San Rafael Swell:** Lupton, 13  
**Honarine mine,** Stockton: Wilson (A W G), 08  
**Horn Silver mine,** southwestern Utah: Emmons (S F), 01a, 02  
**Horn Silver vein,** Beaver Co.: Rohlfing, 17

## Utah—Continued.

*Economic geology—Continued.*

- Hydrocarbon field,** Uinta Basin: Weston, 04  
**Hydrocarbons:** Bardwell, 18; eastern Utah: Maguire, 00b  
**Iron ores:** Leith, 06  
**Iron Co.:** Blake (W P), 86a; Jennings (EP), 05; Warwick, 04  
**Iron Springs district:** Leith, 08a, 10  
**Newhouse:** Jensen, 08  
**southern Utah:** Leith, 04a; Newberry, 81b  
**southwestern Utah:** Hewett, 02  
**Uinta Mountains:** Boutwell, 04c  
**Union Chief and Santaquin mines:** Higgins (W C), 12  
**Iron Co.:** Lee (W T), 07a  
**Iron Springs district:** Kemp, 09c; Leith, 08a  
**Jurassic,** southeastern Utah: Forrester, 18a  
**Lead,** Bear River Range: Richards (R W), 11  
**Canyon Range:** Loughlin, 14  
**Newhouse:** Jensen, 08  
**Ophir district:** Gansl, 10  
**Park City district:** Boutwell, 12; Gow, 07; Zalinski, 11; Daly-West mine: Brinsmade, 08a  
**Promontory district:** Butler (B S), 16  
**San Francisco district:** Butler (B S), 13  
**Stockton district:** Brinsmade, 08b  
**Tintic district:** Brinsmade, 08  
**Union Chief and Santaquin mines:** Higgins (W C), 12  
**Wasatch and Oquirrh ranges:** Silliman (jr), 72  
**Lignite:** Engelmann (H), 76a  
**Manganese:** Harder, 10  
**Mercur district,** Tooele Co.: Allen (R H), 10b; Dern, 04; Gemmell, 97; Neill (J W), 96; Spurr, 95; Waring (W G), 96  
**Miller Hill,** American Fork mining district: Ryan, 17  
**Mineral crest:** Jenney, 03  
**Mineral deposits:** Bradford (R H), 09  
**Mineral resources:** Bixby, 16; Meader, 72  
**Mining districts:** Wheeler (G M), 74a  
**Molybdenum deposits:** Hess, 08b  
**Napoleon-Maghera mines in Sierra Madre,** Box Elder Co.: Higgins (W C), 09a  
**Natural gas,** Salt Lake City: Richardson (G B), 05  
**Newhouse and vicinity:** Jensen, 08  
**Nitrate deposits:** Gale, 12  
**Oil and gas,** Green River field, Grand Co.: Lupton, 14  
**Oil field:** Rogers (A P), 09  
**Oil shales:** Adkinson, 18; Clayton, 85; Ziegler, 18c  
**Green River formation:** Winchester, 17  
**northeastern Utah:** Winchester, 16a; Woodruff, 14b  
**Uinta Basin:** Winchester, 18b  
**Ontario mineral belt:** Jenney, 06-06c  
**Ophir district:** Gansl, 10; Loughlin, 17  
**Ore deposits and intrusive bodies in Utah:** Butler (B S), 15b  
**Ore genesis,** Cottonwood-American Fork and Tintic districts: Loughlin 16a



## Utah—Continued.

*Economic geology*—Continued.

- Ozokerite: Clayton, 79; Higgins, 13; MacFarren 09a; Ohly, 00; Taff, 06c; central Utah: Robinson (H M), 16
- Park City district: Bell (R N), 04; Boutwell, 03, 04b, 05, 12; Van Horn, 14a; Daly-West mine: Brinsmade, 08a; Little Bell mine: Zalinski, 11
- Petroleum: Rogers (A P), 09
- Green River fields in Wayne Co.: Knight (W C), 12; Peet, 09; Anon, 12e
- Salt Lake basin: Boutwell, 05c
- San Juan field: Gregory (H E), 11; James (G D), 11; MacDonald (W T), 12; Woodruff, 12
- southern Utah: Richardson (G B), 08b
- Phosphate deposits: Duffield, 10; Gale, 10b; Jones (C C), 07, 13; Van Horn (F B), 09; Waggaman, 10; Weeks, 07a, 08c
- northeastern Utah: Jones (C C), 13
- northern Utah: Gale, 10b; Peterson (W), 14
- Ogden: Blackwelder, 10
- Uinta Mountains: Schultz, 18a
- Potash, Salduro salt deposit: Gale, 16
- Promontory district: Butler (B S), 16
- Radium: Parsons (C L), 14
- St. George quadrangle: Hewett, 02
- Salt: Eckel, 04d
- San Francisco district: Butler (B S), 13, 13a, 14a
- Sevier Consolidated mine of Gold Mountain-Piute Co.: Higgins (W C), 09
- Silver: Hollister, 87
- Bingham district: Boutwell, 05e
- Box Elder Co., Higgins (W C), 09a
- Mercur district: Spurr, 95
- Newhouse: Jensen, 08
- Ophir district: Gansl, 10
- Park City district: Boutwell, 12; Gow, 07; Zalinski, 11; Daly-West mine: Brinsmade, 08a
- Piute Co., Annie Laurie mine: Lindgren, 06a
- San Francisco district: Butler (B S), 13
- southern Utah: Maguire, 00a
- Stockton district: Brinsmade, 08b
- Tintic district: Tower, 99
- Union Chief and Santaquin mines: Higgins (W C), 12
- Wasatch and Oquirrh ranges: Silliman (jr), 72
- Silver Reef district, southern Utah: Newberry, 80c, 81c; Rothwell, 80
- Silver sandstone district, Washington Co.: Rolker, 81
- Slate deposits: Dale 06c; Eckel, 04b
- Stateline district, Iron Co.: Smith (G H), 02; Anon, 08
- Stockton district: Brinsmade, 08b
- Sulphates and sulpharsenates as ore minerals Butler (B S), 13b
- Sulphur: Russell, 82
- Cove Creek beds: Lee (W T), 07
- San Rafael Canyon: Hess, 13c
- southern Utah: DuFaur, 87
- Tintic district: Brinsmade, 08; Crane, 15; Emmons (S F), 00; Lindgren, 15d; Tibby, 18; Tower, 99, 00

## Utah—Continued.

*Economic geology*—Continued.

- Uinta Mountains: Berkey, 04; Jones (W A), 72
- Uinta Reservation: Smith (W S), 05
- Uintaite (gilsonite): Eldridge, 96, 96a, 01
- Union Chief and Santaquin mines: Higgins (W C), 12
- Uranium, southeastern Utah: Boutwell, 05a
- Uranium-vanadium ores, origin: Notestein, 18
- Vanadium- southeastern Utah: Boutwell, 05a
- Variscite near Lucin: Pepperberg (R V), 10
- Zinc, Boxelder Co.: Jessup, 16
- Ophir district: Loughlin, 17
- Park City district: Boutwell, 12
- Promontory district: Butler (B S), 16
- Tintic district: Loughlin, 14a; Zalinski, 13a
- Historical geology.*
- American Fork mining district: Ryan, 17
- Archean, Wasatch Mountains: Geikie, 80
- Beaver Valley: Lee (W T), 08a
- Bingham Canyon: Fenner, 93; Keith, 05b; Lavagnino, 87
- Blacktail Mountain coal field, Wasatch Co.: Lupton, 12a
- Book Cliffs coal field: Forrester, 18; Richardson (G B), 09b
- Brown's Park beds: Irving, 96
- Cambrian: Burling, 14; Walcott, 08a
- Canyon Range: Loughlin, 14
- Castle Valley: Lupton, 16a
- Coal beds, Thompson, Grand Co.: Clark (F R), 14
- Coalville field: Wegemann, 15
- Cottonwood districts: Howard, 16
- Cottonwood-American Fork region: Butler (B S), 15
- Deep Creek region: Blake (W P), 92; Lupton, 12; Reagan, 17
- Deep Creek Reservation: Reagan, 17a
- Eocene: Conrad, 71
- Formations of eastern Utah: Cross, 07
- General: Denton, 66; Engelmann (H), 58a, 76; Hague, 77; Hayden, 60, 72; Howell (E E), 75; King (C), 78a; Marvine, 75; Meek, 60a, 73; Newberry, 76; Ochsenius, 82; Schiel, 55; Talmage, 01
- Geologic map, northeastern Utah: U S G S Terr, 83b, c
- Grand Canyon district: Dutton, 82a
- Green River area: Lupton, 14
- Green River coal basin: King (C), 70a
- Green River Desert section: Emery, 18a
- Iron Springs district: Leith, 08a
- Jefferson limestone: Kindle, 08b
- Jurassic, southeastern Utah: Forrester, 18a
- Lake Bonneville: Talmage, 02
- La Sal Mountains, Grand Co.: Hill (J M), 13a
- Little Cottonwood district: Wells, 17
- Little Cottonwood granite, Wasatch Mountains: Emmons (S F), 03f
- Lost Creek coal field, Morgan Co.: Clark (F R), 18a
- Manti beds: Cope, 80g
- Mercur district: Spurr, 95
- Morrison formation: Mook, 16
- Navajo country: Gregory (H E), 16a, 17
- Newhouse and vicinity: Jensen, 08



## Utah—Continued.

*Historical geology—Continued.*

- Northeastern Utah: White (C A), 89  
 Northern Utah: Bradley, 73  
 Ontario mineral belt: Jenney, 06  
 Oquirrh Range: Emmons (S F), 05c  
 Ozokerite field, central Utah: Robinson (H M), 16  
 Park City district: Boutwell, 07, 12  
 Promontory district: Butler (B S), 16  
 Randolph quadrangle: Richardson (G B), 13  
 Red beds: Huntington, 07  
 Rocky Mountain region, Paleozoic: Tomlinson, 17  
 St. George quadrangle: Hewett, 02  
 San Francisco district: Butler (B S), 13, 14a  
 San Francisco Range, Beaver Co.: Rohlfing, 17  
 San Juan oil field: Woodruff, 12  
 Sanpete and Sevier valleys: Richardson (G B), 07  
 San Rafael Swell: Lupton, 12b  
 Santaquin and Mount Nebo region: Loughlin, 18a  
 Shinarump group: Lawson, 13a  
 Shinarump section: Lawson, 12d  
 Southern Utah: Davis (W M), 03  
 Tintic district: Crane, 15; Loughlin, 15d; Smith (G O), 00; Tower, 99  
 Tintic Mountains, igneous phenomena: Smith (G O), 98a  
 Toquerville region: Huntington, 03, 04  
 Tushar Range, geology: Butler (B S), 12b  
 Uinta Basin: Eldridge, 96; Scott (W B), 99; Winchester, 18b  
 Uinta beds: Osborn, 95a  
 Uinta formation: Douglass, 14; Riggs, 12  
 Uinta and Wasatch mountains: Atwood, 09  
 Uinta Mountains: Berkey, 05a; Emmons (S F), 07; King (C), 76b; Marsh, 71; Powell, 76; Schultz, 18a; Weeks, 07  
 Uinta Reservation: Berkey, 04a  
 Valley City area, Grand Co.: Dake, 18b  
 Wasatch and Oquirrh ranges: Silliman (jr), 73  
 Wasatch Mountains: Blackwelder, 10a; Emmons (S F), 03f; Hintze, 13; King (C), 76b; Loughlin, 13

*Mineralogy.*

- Aluminum arsenate: Clarke (F W), 12a  
 Amatrice: Zalinski, 09  
 Anglesite, Tintic district: Kraus, 16  
 Anhydrite, new occurrence: Lindgren, 08e  
 Anhydrite as a gangue mineral: Lindgren, 10b  
 Asphalt-like mineral, Asphalt Wash: Hills, 86a  
 Aurichalcite: Penfield, 91; Big Cottonwood Canyon: Ledoux, 17  
 Beaver Co. minerals: Butler (B S), 11a; Schaller, 12  
 Beaverite: Butler (B S), 11b  
 Beryl, red: Hillebrand, 05c  
 Bixbyite: Penfield, 97a  
 Bournonite, Park City: Van Horn, 15  
 Brachantite: Zambonini, 01  
 Calciovolborthite: Hillebrand, 13a  
 Calcium vanadates: Hillebrand, 13b  
 Chrysocolla: Santos, 77b

## Utah—Continued.

*Mineralogy—Continued.*

- Clayton Peak: Field (V W), 17  
 Connellite, Tintic district: Ford (W E), 15a  
 Copper minerals: Hillebrand, 88; Mackenzie, 85  
 Crandallite, Tintic district: Loughlin, 17a  
 General: Bixby, 16  
 Gilsonite, Uintah Co.: Raymond, 89; Uinta Mountains: Locke, 87  
 Gypsum: Moses, 93  
 South Wash.: Smith (G O), 94  
 Wayne Co.: Moses, 93a  
 Hydrocarbons: Bardwell, 18  
 Ilsemanite, Ouray: Schaller, 17a  
 Jarosite, Tintic district: Genth, 90  
 Leadhillite: Palache, 09a  
 Magnesioludwigite, Big Cottonwood Canyon: Butler (B S), 17  
 Metacinnabarite: Penfield, 85  
 Metaheawettite: Hillebrand, 14  
 Meteorite, Salt Lake City: Dana (E S), 86c  
 Mimetite: Bowman (H L), 03; Wherry, 18  
 Minerals: Silliman (jr), 73b  
 Onofrite: Brush, 81  
 Ophir district: Loughlin, 17  
 Orpiment: Blake (W P), 81  
 Ozocerite: Newberry, 79b  
 Park City district: Van Horn, 14a  
 Pharmacosiderite, Mammoth mine: Pearce, 88  
 Phosphorescent zinc blende: Headden, 06  
 Pintadoite: Hess, 14b  
 Plumbojarosite: Hillebrand, 10a  
 Pyrite crystals from Bingham: Rogers (A F), 09  
 Racewinite, Bingham: Winchell (A N), 18b  
 Realgar: Blake (W P), 81  
 San Francisco district: Butler (B S), 13  
 Selenite: Talmage, 93, 11  
 Sepiolite: Chester (A H), 77a  
 Sulphates and sulpharsenates as ore minerals: Butler (B S), 13b  
 Sundry minerals: Hillebrand, 85b  
 Thaumassite, Beaver Co.: Butler (B S), 11a  
 Tiemannite: Penfield, 85  
 Tintic district: Means, 16; Pearce, 87a, b  
 Topaz: Engelmann (H), 63; Thomas Range: Alling, 87; Jones (A J), 95a  
 Topaz-bearing rhyolite, Thomas Range: Patton, 08  
 Tungstenite, Little Cottonwood Canyon: Kuhre, 17; Wells, 17, 18b  
 Tyrolite: Hillebrand, 90  
 Uintaite: Blake (W P), 85, 90b; Uinta Mountains: Locke, 87  
 Uvanite: Hess, 14b  
 Variscite: Schaller, 12c, d; Lewiston: Packard (R L), 94a  
 Wardite: Davison (J M), 96  
 Willemite, Beaver Co.: Clarke (R W), 16a  
 Wurtzilite, Uinta Mountains: Blake (W P) 90, 90a; Wurtz, 90

*Paleontology.*

- Algae of petroleum-yielding shales of Green River formation: Davis (C A), 16  
 Apatosaurus, Jensen: Holland, 16



**Utah—Continued.***Paleontology—Continued.*

- Artiodactyla, selenodont, Uinta beds: Scott (W B), 99; Uinta Basin: Peterson, 18  
 Bathmodon, Evanston: Cope, 72e, 1  
 Bingham district: Girty, 05  
 Carboniferous: Meek, 60c; Newberry, 76a  
 Chara, Wales: Knowlton, 88c  
 Cretaceous: White (C A), 81e  
 Devonian, Wasatch Mountains: Tenney, 73  
 Diplacodon: Hatcher, 95  
 Dolichorhinus: Peterson, 14c  
 Dystrophaeus, Triassic: Cope, 77i  
 Eocene Mammalia: Wortman, 01a; titano-theroid, Uinta basin: Gregory (W K), 12b  
 Gar pike: Cockerell, 09k  
 General: Meek, 70; White (C A), 79d  
 Heterodontosuchus, Triassic: Lucas (F A), 98a  
 Horses, Walker Lake: Merriam (J C), 13f  
 Insecta: Scudder, 77, 92  
 Invertebrata: Meek, 72a; White (C A), 74  
 Jefferson limestone fauna: Kindle, 08b  
 Laramie Invertebrata: White (C A), 78  
 Montana flora: Knowlton, 00  
 Musk-ox skull: Chadbourne, 71  
 Ostracoda, Cretaceous: Jones (T R), 93  
 Phosphate beds of Park City formation, fauna: Girty, 10  
 Protoptychus, Uinta beds: Scott (W B), 95d  
 Silurian fauna: Kindle, 08  
 Tertiary fresh-water Mollusca: Hannibal, 12  
 Thaynes limestone fossils: Girty, 10b  
 Titanotheres, Uinta beds: Douglass, 10; Peterson, 14, 14a; Riggs, 12  
 Tortoise, Jurassic: Gilmore, 16b  
 Turtles, Uinta formation: Gilmore, 16a  
 Uinta Basin: Hatcher, 95b  
 Uinta beds, Mammalia: Osborn, 95a; Scott (W B), 88, 90  
 Uinta Mountains: White (C A), 76  
 Uintacrinus, Cretaceous: Grinnell, 76a  
 Vertebrata: Leidy, 70g; Wasatch beds: Cope, 72a

*Petrology.*

- Crystalline rocks, Salt Lake and Davis cos.: Neal, 96  
 General: Zirkel, 77  
 Gold Hill area, Tooele Co.: Kemp, 18b  
 Henry Mountains: Dutton, 77  
 Iron Springs district: Leith, 08a  
 Lamprophyre dikes, Santaquin and Mount Nebo region: Loughlin, 18a  
 Newhouse and vicinity: Jensen, 08  
 Phosphorescent limestone: Lewis (H C), 84d  
 Tintic Mountains, igneous phenomena: Smith (G O), 98a  
 Volcanic dust: Montgomery (H), 95

*Physical geology.*

- Bannock overthrust: Richards (R W), 12  
 Basin-range structure, Cricket Range: Burling, 12  
 Bingham district: Keith, 05b  
 Bonneville Lake beds, origin: Keyes, 17e  
 Canyons of the Colorado: Powell, 95a  
 Cave, Clinton's, Oquirrh Range: Lee (L A), 79  
 Conglomerate puddings, Paria River: Talmage, 00c

**Utah—Continued.***Physical geology—Continued.*

- Fault slip, Ogden Canyon: Talmage, 01a  
 Faulting, Great Basin: Russell, 87; Tintic district: Loughlin, 16c  
 Henry Mountains: Gilbert, 77  
 High plateaus: Dutton, 80  
 Humboldt Lake Range: Louderback, 03a  
 Hurricane fault, Toquerville district: Huntington, 03, 04  
 Laccolithic mountain groups: Cross, 94b  
 Natural bridge: Winslow, 98  
 Ore deposits and intrusive bodies in Utah: Butler (B S), 15b  
 Ripple marks, Jurassic: Gilbert, 84c  
 Seismographs in Utah: Talmage, 07  
 Tintic district: Tower, 99  
 Uinta Mountains: Powell, 76; structure: Schultz, 18a  
 Valley City graben: Dake, 18b  
 Wasatch Mountains: Hintze, 13  
 Wind erosion in the plateau country: Cross, 08a
- Physiographic geology.*  
 Basin ranges, origin: Davis (W M), 03e  
 Bingham Canyon, physiographic conditions at time of copper enrichment: Atwood, 16  
 Castle Valley: Lupton, 16a  
 Colorado River: Powell, 75  
 Colossal bridges: Winchell (N H), 04c  
 General: Gilbert, 75; Howell (E E), 75; Marvin, 75; Poole, 73; Powell, 78  
 Glacial deposits, so called, Navajo Reservation: Gregory (H E), 15b  
 Glaciation: Gilbert, 74c; Uinta Mountains: Atwood, 07  
 Grand Canyon district: Dutton, 82a  
 Great Basin: Brewer (W H), 89  
 Great Basin ranges: Davis (W M), 03a  
 Great Salt Lake: Gilbert, 78; Talmage, 96, 00, 01b; outlet: Gilbert, 76, 78a; Packard (A S), 76a; Peale, 78a  
 Henry Mountains: Gilbert, 77  
 High Plateaus: Dutton, 80  
 Humboldt Lake Range: Louderback, 03a  
 Lake Bonneville: Davis (W M), 83g; Gilbert, 77a, 82, 86, 90; Packard (A S), 76; Talmage, 02  
 age: Keyes, 18  
 orographic origin: Keyes, 17  
 outlet: Gilbert, 80  
 Lakes of the Uinta Mountains: Atwood, 08  
 Natural bridges: Cummings, 10; Parsons (T S), 07  
 Nonnezoshe, natural bridge: Pogue, 11c  
 Northeastern Utah: White (C A), 89  
 Penepplain, Tertiary: Umpleby, 12a  
 Physiographic features: Huntington, 07; Johnson (D W), 06b  
 Rainbow natural bridge: Pogue, 11c  
 Sevier Valley: Dutton, 78  
 Southern Utah: Davis (W M), 93  
 Southwestern Utah: Huntington, 03  
 Stream piracy, Provo and Weber rivers: Anderson (G E), 15  
 Toquerville district: Huntington, 04  
 Uinta Mountains: Atwood, 07, 09; Emmons (S F), 07  
 Valley City graben: Dake, 18b



**Utah—Continued.***Physiographic geology—Continued.*

Wasatch, Canyon, and House ranges: Davis (W M), 05a

Wasatch Mountains: Atwood, 09; Gilbert, 80c; Hintze, 13

*Underground water.*

Beaver Valley: Lee (W T), 08a

Ground water in Box Elder and Tooele cos.: Carpenter, 13

Juab, Millard, and Iron cos.: Meinzer, 11a

Sanpete and Sevier valleys: Richardson (G B), 07

Sulphur Springs, San Rafael Canyon: Hess, 13c

Utah Lake and Jordan River valleys: Richardson (G B), 06

Utica slate: Ami, 82a; Walcott, 83

Uvalde folio, Tex. (no. 64): Vaughan, 00

Valdez gold-mining district, Alaska: Storm, 12

**Valleys.**

Aggradation and degradation of: Moody (A E), 07

Alaska, Yakutat Bay region: Tarr (R S), 09

Anticlinal valleys: Purdue, 14e

Arkansas Valley: Keyes, 01b

Classification: Powell, 74a

Colorado: Powell, 75a

Configuration in low latitudes: Chamberlin (T C), 10b

Cordilleras: Shaler, 01

Cross valleys, origin: Davis (W M), 83f

Filling by intermittent streams: Parkins, 11

Formation: Carney, 09a; Fenneman, 09; Hovey, 09; Kennedy, 89

General: Howell (E E), 75; Shaler, 88f; Tyrell, 12a

Glacial valleys: Niles, 78a

Grand Canyon region: Powell, 73a

Hanging valleys: Johnson (D W), 09a; Russell, 05b

Illinois, Danville region: Wegemann, 09; northwestern: Carman, 09

Iowa, eastern: Carman, 09

Lateral hanging valley, unusual type: Mansfield, 11a

Meandering valleys: Davis (W M), 14a

Montana, Crazy Mountains: Mansfield, 09

New York, Finger Lake region: Dryer, 04; Lincoln, 92

Long Island: Lewis (E), 77a

Moravia quadrangle: Carney, 09c

Watkins Glen-Catatonk district: Williams (H S), 09

Origin: Purdue, 12d; Warren (G K), 78

Michigan, Huron Valley: Parkins, 10

Ohio, open valley near Harrisburg: Nichols (R H), 10

Pennsylvania, western: Shaw (E W), 11

River valleys, New England: Shaler, 87

Solution valleys: Purdue, 01

Stream valleys: Rich, 14a

Submerged valleys: Davis (W M), 13a; Sandusky Bay: Mosely, 02

Transverse mountain valleys, origin: Le Conte, 98

Types and origin: Powell, 75a

U-shaped valleys: Coleman, 13h; Hovey, 09; Lane, 15b

**Valleys—Continued.**

Yosemite Valley, origin: Blake (W P), 00; Clark (G), 10; Gannett, 01; Johnson (D W), 10; Muir, 74a; Turner, 98d, 00a

hanging valleys: Johnson (D W), 11

striped rock floor: Matthes, 10b

Yosemite and Hetch Hetchy valleys: Matthes, 12

**Vanadium.**

Association with petroleum and asphalt: Bird, 14

Bibliography: George (R D), 11

Colorado: Fleck, 08, 09a

Boulder Co.: Wood (J R), 10

Paradox Valley: Curran, 11

Placerville: Fleck, 08; Hess, 13b

Rio Blanco Co.: Gale, 07

Routt Co.: Gale, 08a

southern: Fleck, 07

southwestern: Thomas (K), 12

Telluride: Zalinski, 08

Distribution, United States: Hillebrand, 98

General: Baskerville, 08; Boalich, 18; Edwards (W F), 04a; Fleck, 16; Hillebrand, 00; Joseph, 16; Moore (R B), 13

New Mexico: Leatherbee, 11

Caballos Mountains: Allen (C A), 11; Clifford, 11; Hess, 13; Larsh, 11

Grant Co.: Larsh, 13

Sierra Co.: Leatherbee, 10

Ores in sandstone and shale: Lindgren, 11a

Source of vanadium in sedimentary rocks: Phillips (A H), 18

Sources: Surr, 10a

United States: U S G S, 83

Utah: Pepperberg (L J), 11

Van Cleve's fossil corals: Hall, 83h

Vancouver Island. *See* British Columbia.

Van Hise, C. R., biography: Berkey, 18a; Chamberlin (T C), 18b; Anon, 18c

Van Horn folio, Tex. (no. 194): Richardson (G B), 14

Varanosaurus: Williston, 10e

Vein, sand-filled: Clarke (J M), 07b

Vein walls: Brown (R G), 97; Rickard, 96; Schwarz (T E), 97; Warren (E R), 97

**Veins.**

Colorado, Cripple Creek: Stone (G H), 97

Cross-fiber veins, origin: Taber (S), 16

Form of fissure walls: Glenn, 96b

Formation: Comstock, 92a; Shaler, 99c; New York: Taber (S), 18

Joint veins: Gilbert, 02c

Metalliferous, genesis: Le Conte, 83a

Origin of chrysotile veins: Taber (S), 17a

Structure of ore-bearing veins, Mexico: Halse, 02

Veinlets in sedimentary rocks, origin: Taber (S), 17b

Water-worn vein specimens: Holman, 96

Verd antique, Vermont: Jacobs (E C), 16a

Velardeña district, Mex.: Spurr, 08a

Vermes. *See also* Invertebrata.

Annelid jaws, Ontario: Hinde, 79a

Annelid teeth, Ontario Co., N. Y.: Clarke (J M), 87

Annelida, tubicolar: Nicholson, 72d; Cincinnati: Nicholson, 73c



## Vermes—Continued.

- Annelida: middle Cambrian: Walcott, 10  
 British Columbia, Mount Stephen, Cambrian: Matthew (G F), 99  
 Cambrian: Walcott, 10, 16  
 Cincinnati: Ulrich, 78  
 Conodonts, Canada and New York: Hinde, 79  
 Maryland, Devonian: Clarke (J M), 13e; Kindle, 13; Ohern, 13a  
 New York, Devonian: Clarke (J M), 03d  
 Palaeocampa anthrax, Mazon Creek: Fritsch, 07  
 Salem limestone of Indiana: Beede, 06  
 Scolithus, Chazy formation, Ottawa: Ami, 87  
 Vermiculites: Cooke (J P), 74, 75a  
 Vermilion district: Clements, 03; Van Hise, 01  
 Vermilion Lake pyrite deposits: Moore (E S), 11b  
 Vermont.

- Bibliography: Perkins (G H), 02b, 04  
 Brattleboro region: Allen (J A), 21  
 Frozen well, Brandon: Jackson, 59h, 62c, 72  
 General: Hall (S R), 46; Hitchcock, 70a; Seely, 01; Thompson (Z), 56a; Young (A), 56  
 Survey, reports: Adams (C B), 46, 47, 48; Cutting, 75, 76, 78; Hitchcock (E), 57a, 58a, 59, 61; Perkins (G H), 02; Thompson (Z), 56  
 State cabinet, history and condition: Perkins (G H), 10a

*Economic geology.*

- Asbestos deposits: Diller, 11; Kemp, 01d; Richardson (C H), 10, 11  
 Belvidere Mountain: Marsters, 04, 05, 05a  
 Lamoille and Orleans cos.: Kemp, 01b  
 northern Vt.: Kemp, 01d  
 Brandon: Hitchcock (E), 53a  
 Bridgewater: Jackson, 54d  
 Building stone: Hawes, 84  
 Cement materials: Eckel, 13; Richardson (C H), 06  
 Clay, Pownal: Dewey, 27  
 Copper: Weed, 04c, 11; Wheeler, 83; Jacobs (E C), 16  
 Orange Co.: Fay, 09; Judson, 09; Smyth (H L), 04  
 Vershire: Thompson (A P), 13  
 Dolomite, eastern Vermont: Dale (T N), 15  
 General: Adams (C B), 45, 46, 47; Cutting, 72; Hager, 61; Hall (S R), 47; Perkins (G H), 02; Thompson (Z), 53  
 Gold: Hubbard (O P), 53; Jackson, 67b  
 Granite: Dale, 08, 09; Perkins (G H), 98, 12; Richardson (C H), 06; Barre area: Finlay (G I), 02  
 Iron: Benton, 86a; Hall (F), 21  
 Bennington: Hall (F), 21a  
 hematite, Franklin Co.: Brainerd, 85  
 Iron and manganese: Dewey, 22a  
 Kaolin: Nevius, 97  
 Lignite, Brandon: Perkins (G H), 05a; Ries, 96  
 Manganese: Harder, 10; South Wallingford: Jones (R W), 18  
 Marble: Dale, 12, 14; Elliott (A H), 85; Hager, 58; Jackson, 56a; Newberry, 70f; Perkins (G H), 98, 14; Seely, 85a; Silliman, 39a  
 calcite, eastern Vt.: Dale (T N), 14a, 15

## Vermont—Continued.

*Economic geology—Continued.*

- Marble: Orange Co.: Richardson (C H), 02  
 Roxbury: Hayes (A A), 55a  
 Winooski: Hitchcock (C H), 68c; Perkins (G H), 83, 85  
 Marble belt: Brainerd, 85  
 Mineral industries, statistics: Perry, 89, 90, 94  
 Mineral resources: Perkins (G H), 00, 02c, 04a, 05b, 12  
 Minerals, catalog: Hall (F), 24  
 Northeastern Vt.: Richardson (C H), 06  
 Orleans Co.: Hall (S R), 71  
 Quartz veins: Smith (G O), 04a  
 Serpentine: Silliman, 39a  
 Slate: Dale, 06c; Perkins (G H), 98; Richardson (C S), 54b  
 Soapstone: Perkins (G H), 08c  
 Talc: Jacobs (E C), 14, 16a; Perkins (G H), 08c  
 Verd antique: Jacobs (E C), 16a  
*Historical geology.*  
 Addison Co.: Seely, 10  
 Albany terranes: Richardson (C H), 12a  
 Algonkian rocks: Whittle, 94  
 Algonkian-Cambrian boundary: Dale (T N), 16  
 Ascutney Mountain: Daly (R A), 03  
 Barre area: Finlay (G I), 02  
 Beekmantown, Champlain Valley: Brainerd, 90a  
 Beekmantown and Chazy formations: Seely, 06  
 Belvidere Mountain: Marsters, 05, 05a  
 Bennington: Gordon (C E), 14  
 Bird Mountain: Dale, 00  
 Brandon: Jackson, 62c  
 Brandon clays: Woodworth, 04  
 Brandon lignite: Perkins (G H), 05a  
 Burlington quadrangle: Perkins (G H), 10b  
 Calais, East Montpelier, and Berlin: Richardson (C H), 16  
 Calciferous, Champlain Valley: Brainerd, 90  
 Cambrian: Edson, 06; Marcou, 61c, 62b, 81; Perkins, 08d  
 Cambrian and Cambro-Silurian: Hitchcock (C H), 76a  
 Champlain Valley: Van Ingen 96; Walcott, 83d  
 Chazy rocks: Brainerd, 88, 91, 96  
 Chittenden Co.: Perkins, 08b; Thompson, 46  
 Clay slate, Connecticut Valley, age: Hitchcock (E), 52b  
 Connecticut Valley: Hitchcock (E), 23; Smith (A), 32  
 Craftsbury terranes: Richardson (C H), 12  
 Cuttingsville: Eggleston, 18  
 Dikes, Shelburne: Hitchcock (E) 61b  
 Fort Cassin beds: Whitfield, 90, 90c  
 Franklin Co.: Perkins (G H), 08a  
 General: Adams (A N); Adams (C B), 45, 46; Barrande, 62; Billings, 72c; Dana (J D), 77a; Hitchcock (C H), 60d, 68d, 84a, 85; Hitchcock (E), 46, 59b, 61, 61d; Hunt, 68a; Perry, 69; Seely, 01; Thompson (Z), 48, 53  
 Geologic history: Perkins (G H), 11  
 Geologic map: Hager, 59; Hitchcock (C H), 77g  
 Grand Isle: Perkins (G H), 02d, 04b



## Vermont—Continued.

*Historical geology—Continued.*

- Green Mountain gneiss: Hitchcock (C H), 84c  
 Green Mountain region: Dale, 96; Hitchcock (C H), 92b; Perkins (G H), 12  
 Green Mountains, age: Dana (J D), 80b  
 Greensboro: Richardson (C H), 14  
 Hanover quadrangle: Hitchcock (C H), 08  
 Hardwick: Richardson (C H), 14a  
 Helderberg, formation, Vernon: Dana (J D), 77c  
 Hudson River rocks: Hall, 62p  
 Irasburg: Richardson (C H), 12b  
 Lake Champlain region: Shimer, 03a  
 Lamoille and Orleans cos., serpentine belt: Marsters, 04  
 Lignite, Brandon: Dale, 04b; Hitchcock (E), 53d  
 Lignitic deposit, Burlington: Thompson (Z), 51  
 Marble belt: Brainerd, 85  
 Newport, Troy, and Coventry: Richardson (C H), 08  
 Northeastern Vt.: Richardson (C H), 06  
 Northern Vt.: Hall (S R), 45, 61  
 Northwestern Vt.: Perry, 71e  
 Orange Co.: Richardson (C H), 02  
 Ordovician: Marcou, 61c  
   central Vt.: Richardson (C H), 18  
   Green Mountain region: Dana (J D), 73a  
   outlier in Sudbury: Dale, 12a  
 Orleans Co.: Hall (S R), 71  
 Paleozoic, early: Foerste, 93b  
 Potsdam sandstone: Billings, 62c; Hall, 62p; Perry, 68  
 Quartzite, Green Mountains: Dana (J D), 72b  
 Red sandstone formation, age: Billings, 62b, d; and relations: Perry, 68, 68a  
 Ripton region, Cambrian conglomerate: Dale, 10a  
 Rutland-Danby ridge: Dale, 94a  
 St. Albans: Edson, 06a  
 Sections crossing Vt.: Hitchcock (C H), 84  
 Slate belt, western Vt.: Dale, 99  
 Stamford gneiss: Snyder, 96  
 Stockbridge limestone: Dale, 92; Cambrian age: Wolff, 91a  
 Swanton, geology: Edson, 08  
 Taconic area: Walcott, 88  
 Taconic rocks, Addison Co.: Adams (C B), 47c; Georgia region: Marcou, 88a  
 Taconic Mountains, stratigraphic features: Keith, 13  
 Taconic Range: Dana (J D), 84; north end: Dale, 04c  
 Taconic stratigraphy: Dana (J D), 85b  
 Taconic system: Emmons (E), 44; geologic age: Dana (J D), 82b  
 Trap dikes, Lake Champlain region: Kemp, 93d  
 Unconformity, pre-Cambrian: Keith, 14  
 Washington limestone: Richardson (C H), 98  
 Western Vt.: Perkins (G H), 16; Rogers (W B), 60a  
 Winooski marble: Billings, 72c; Perkins (G H), 85  
 Woodbury: Richardson (C H), 14a
- Mineralogy.*  
 Catalog: Hall (F), 24

## Vermont—Continued.

*Mineralogy—Continued.*

- Connecticut Valley: Hitchcock (E), 23  
 General: Hitchcock (E), 61  
 Notes: Dewey, 22  
 Quartz, containing rutile crystals, Waterbury: Hayes (A A), 51  
 Quartz crystal with cavity, Waterbury: Alger, 50b  
 Rutilated quartz crystals: Alger, 50d; Hubbard, 50a  
 Rutile and chlorite in quartz, Hubbard (O P), 50a  
 Steatite: Dewey, 22a
- Paleontology.*  
 Beekmantown and Chazy faunas: Seely, 06a  
 Brandon, lignite fruits: Hitchcock (E), 53a, d, 57c; Jeffrey, 06a; Knowlton, 02b; Lesquereux, 61; Perkins (G H), 04c, d, 05a, 06, 06a  
 Calais, East Montpelier, and Berlin: Richardson (C H), 16  
 Cambrian: Billings, 61d; Matthew (G F), 97; Whitfield, 84  
 Carpolithes, Brandon: Hitchcock (C H), 62c  
 Cetacea from Pleistocene: Perkins, 08  
 Cetacean, Rutland: Thompson (Z), 50a  
 Chazy, Rutland: Billings, 72g; Raymond (P E), 05b, 06; Seely, 06  
   Brachiopoda and Ostracoda: Raymond (P E), 11  
   Gastropoda: Raymond (P E), 08  
 Conocephalus: Hall, 47a  
 Cryptozoa, Ordovician: Seely, 06  
 Elephant: Agassiz (L), 50d  
 Elephant and cetacean bones: Thompson (Z), 50  
 Fort Cassin fauna: Whitfield, 86, 90, 97a  
 General: Hitchcock (E), 61; Thompson (Z), 53  
 Grand Isle: Perkins (G H), 02d  
 Infusorial deposits: Bailey (J W), 46a  
 Mesonacis: Walcott, 85a  
 Ordovician: Billings, 61d; Champlain Valley: White (T G), 00  
 Protocaris, Georgia: Schuchert, 97a  
 St. Albans: Edson, 06a  
 Spongida, Chazy formation: Seely, 02  
 Strophochetus: Seely, 85, 08  
 Stromatoceria, Isle La Motte: Seely, 94, 04  
 Trenton, Highgate Springs: Ami, 96b  
 Trilobites, Beekmantown: Raymond (P E), 10  
   Cambrian: Hall, 59g, k, 60d  
   Chazy: Raymond (P E), 10b, f  
   red sandstone: Hitchcock (C H), 61e  
 Whale, Charlotte: Hitchcock (E jr), 59  
 Winooski marble fossils, Scranton: Billings, 72c
- Petrology.*  
 Ascutney Mountain: Daly (R A), 03  
 Barre area: Finlay (G I), 02  
 Belvidere Mountain: Marsters, 05, 05a  
 Camptonite dike, Summit: Nason, 89c; Danby-borough: Marsters, 95  
 Conglomerate, Green Mountains: Whittle, 92  
 Cuttingsville igneous rocks: Eggleston, 10, 18  
 General: Barker, 61; Hitchcock (C H), 59a, Hitchcock (E), 61  
 Grand Isle, dikes: Shimer, 02a  
 Granite, Barre: Finlay (G I), 01



## Vermont—Continued.

*Petrology*—Continued.

- Granite: inclusions: McCormick, 86  
 variolitic, Craftsbury: Kroustschoff, 85  
 Ophiolites, Green Mountains: Hunt, 57c  
 Schist: Hitchcock (C H), 60  
 Serpentine: Wigglesworth, 15; Belvidere Mountain: Marsters, 07  
 Thetford, basaltic boulders: Hovey, 94  
 Trap dikes, Lake Champlain region: Kemp, 93d

*Physical geology*.

- Clay concretions, Connecticut River: Arms, 91; Sheldon, 00  
 Dikes, Chittenden Co.: Thompson (Z), 61; Shelburne: Hitchcock (E), 61b  
 Distorted pebbles in conglomerate: Hitchcock (C H), 60c; Hitchcock (E), 60  
 Fractured ledges of slate: Hitchcock, 58a  
 Fractured strata, Guilford: Whitney, 50a  
 Frozen well, Brandon: Jackson, 62c  
 Gotham's cave: Hitchcock, 95e  
 Green Mountain region: Dale, 96, 02; Whittle, 94a  
 Lake ramparts: Hitchcock (C H), 60b  
 Long Lake and Mud Lake, eruption: Dwight, 26  
 Pleistocene deformation near Rutland: Keith, 17a  
 Polished rocks: Adams (C B), 47d

*Physiographic geology*.

- Burlington region, surficial: Hitchcock (C H), 06  
 Champlain Valley, surficial geology: Hitchcock (C H), 06a, 10; Pleistocene history: Baldwin, 94  
 General: Hager, 61a; Hitchcock (E), 61  
 Glacial Lake Memphremagog: Hitchcock (C H), 07  
 Glacial shore-lines: Merwin, 08  
 Glaciation: Hitchcock (E), 57; Seely, 77; Upham, 89d  
 Green Mountains: Goldthwait, 16a; Hitchcock (C H), 60a, 04; Hungerford, 68  
 Greensboro, Hardwick, and Woodbury: Jones (D J), 16  
 Wilmington area: Hubbard (G D), 18  
 Moraines: Hitchcock (C H), 92a  
 Northwestern Vt.: Perry, 71e  
 Postglacial marine waters: Fairchild, 16  
 Potholes, near Poultney: Nichols, 65  
 Quaternary: Stevenson, 06a  
 Taconic physiography: Dale, 05a  
 Terraces, preservation: Hitchcock (C H), 03b  
 Ripton: Hungerford, 68b  
 West River at Brattleboro: Fisher (E F), 06; Johnson (D W), 07d

*Underground water*.

- Drinking waters: Perkins (G H), 06b  
 Fort Ticonderoga quadrangle: Dale, 05b  
 General: Perkins (G H), 04e, f, 05  
 Taconic quadrangle: Taylor (F B), 05

Vernal coal fields, Uintah Co., Utah: Lupton, 12

Vertebrata (general). *See also* Amphibia; Aves; Mammalia; Pisces; Reptilia.

Aftonian mammalian fauna: Calvin, 09b

Air-breathing Vertebrata, origin: Barrell, 16a

## Vertebrata—Continued.

- Alaska: Gaudry, 03  
 Eschscholtz Bay: Buckland, 31  
 Pleistocene vertebrates: Gilmore, 08  
 Alabama, Zeuglodon: Buckley, 46  
 Alberta: Sternberg, 18  
 Cypress Hills: Cope, 91a  
 Milk River: Cope, 75f  
 Red Deer River district: Lambe, 99a  
 American Museum of Natural History: Osborn, 95c; collections: Matthew (W D), 03a; expeditions: Matthew (W D), 13d  
 American Society of Vertebrate Paleontology: Loomis, 08.  
 Anatomy, paired limbs, origin: Dean, 02a, b; temporal fossæ: Gregory (W K), 15a  
 Anguilla: Cope, 71j, 83  
 Arizona, Triassic: Lucas (F A), 01f  
 Belly River fauna: Lambe, 02  
 Beluga, Leda clay, Montreal: Dawson (J W), 95e  
 Bibliography: Eyermann, 91, 92, 93; Hay, 02  
 Bridger fauna: Leidy, 73  
 Bridger group, Wyo.: Cope, 73 c, d, e  
 California, Mare Island: Blake (W P), 64a  
 Mohave Desert: Merriam (J C), 15g  
 Rancho La Brea: Wyman, 18  
 Canada: Lambe, 03, 04, 05b, 08, 11a, 14; Whiteaves, 87  
 Carboniferous: Hay (O P), 00  
 Carnegie Museum: Hatcher, 03e; Wortman, 00b  
 Casts, models, etc., American Museum of Natural History: Osborn, 04f  
 Census of North American: Hay (O P), 99f  
 Chevron bones, homology: Cope, 78u  
 Collecting in field: Gregory (W K), 01; Osborn, 01b  
 Collecting in the West: Osborn, 05d  
 Colorado: Cope, 74  
 Denver Basin: Cannon, 06; Marsh, 96a  
 Miocene: Cope, 74h  
 Pliocene: Cope, 74a  
 Tertiary: Cope, 73a  
 Connecticut, East Windsor: Wyman, 55  
 Connecticut Valley: Wyman, 55a  
 Continuity of development: Matthew (W D), 10e  
 Correlation through vertebrate paleontology: Osborn, 09e  
 Cretaceous: Bowen (C F), 15; Cope, 74b, 78b  
 Kansas: Cope, 72  
 Rocky Mountain region: Delafontaine, 77  
 Descriptions of new forms: Marsh, 77c  
 Development and geologic relations: Case, 98  
 Dinosaurs, Tertiary: Lee (W T), 13b  
 Embryology and vertebrate paleontology: Lull, 10  
 Eocene, Bridger Basin, Wyo.: Osborn, 78  
 Maryland: Clark (W B), 01a  
 Equus beds fauna: Cope, 89b  
 Eryops and origin of limbs: Gregory, 11, 12d, e  
 Evolution: Cope, 85a, j, 96; time ratios: Matthew (W D), 14a  
 Evolution through rectigradations and fluctuations: Osborn, 08a



## Vertebrata—Continued.

- Evolutionary evidences: Williston, 12  
 Exhibition of fossil vertebrates: Lucas (F A), 96  
 Exhibition series at National Museum: Gilmore, 06e  
 Families, synopsis: Cope, 89k  
 Faunal relations of early vertebrates: Williston, 09a  
 Flight in vertebrates: Lull, 06a  
 Florida: Hay (O P), 16b; Sellards, 17e  
   Alachua clays: Leidy, 96  
   Peace Creek: Leidy, 89e  
   Tertiary and Pleistocene: Sellards, 16  
   Vero: Hay (O P), 17b, c  
 Footprints, Kansas Coal Measures: Marsh, 94c;  
   Kansas Permian: Moodie, 13  
 Fort Pierre: Cope, 77a  
 Fossil quarry in Nebraska: Peterson, 06b  
 Fossil skeletons, excavating, preparing, and  
   mounting: Hermann, 08  
 General: Agassiz (L), 51; Cope, 74l, 80b, 87o,  
   91, 92i, 97a, 98; Dana (J D), 63d; God-  
   man, 25; Harlan, 35e; Lucas (F A), 00g;  
   Lull, 15d; Marsh, 73l, 76f, 77d; Matthew  
   (W D), 02; Moodie, 09; Osborn, 98, 00k,  
   01e, g, 05k; Shufeldt, 89; Sinclair, 12;  
   Wiedersheim, 81; Williston, 02b; Wood-  
   ward (A S), 09  
 Georgia: Habersham, 46; Harlan, 42a  
 Great Plains, Tertiary: Cope, 73q, r, s  
 Habitat, early vertebrates: Chamberlin (T C),  
   00b  
 Hell Creek beds of Montana: Brown (B), 07  
 Idaho: Leidy, 70g  
 Illinois: Cope, 75zc; Permian: Cope, 83l  
 Indiana, post-Pliocene: Cope, 84a  
 Intercentrum of terrestrial Vertebrata: Cope,  
   88b  
 Introduction and succession: Marsh, 77d  
 Judith River and Cow Island beds: Sternberg,  
   14  
 Judith River formation: Cope, 77a; Stanton, 05  
 Kansas: Cope, 71t; Sternberg, 07b, 08  
   Cretaceous: Cope, 71n; Sternberg, 05, 13;  
   Williston, 94a  
   Equus beds: Hay (O P), 17e  
   Miocene: Sternberg, 06  
   Neocomian: Cragin, 94c  
   Niobrara and Laramie forms: Sternberg, 11  
   Permian: Williston, 97c  
   Pleistocene: Williston, 98c  
   Smoky Hill River: Cope, 71o  
 Kentucky, Big Bone Lick: Cooper (W), 31a  
 Laboratory methods in vertebrate paleontol-  
   ogy: Hermann, 09  
 Limbs, vertebrate, origin: Osburn, 07  
 List of genera established by Marsh: Marsh, 80f  
 Localities for Laramie mammals and dinosaurs:  
   Hatcher, 96a  
 Loup Fork fauna: Cope, 80d  
 Mammalian migrations between Europe and  
   North America: Matthew (W D), 08b  
 Marsh collections: Merrill (G P), 00a; Wal-  
   cott, 00b  
 Maryland, Chesapeake Beach, Miocene: Palmer  
   (W), 15

## Vertebrata—Continued.

- Mexico: Edwards, 67; Valle de Oaxaca: Con-  
   zatti, 08  
 Mid-Cretaceous fauna: Osborn, 02c  
 Miocene: Cope, 67c, 69b  
   Marine, Atlantic Coastal Plain: Cope, 95d  
   Maryland: Clark (W B), 04a  
 Mississippi: Dickerson, 45  
 Missouri: Keyes, 94d; Koch (A C), 40 catalog:  
   Hambach, 90  
 Missouri River region, catalog: Leidy, 57  
 Models: Osborn, 98m  
 Montana, Fort Union beds: Douglass, 08  
   Judith River region: Leidy, 59f  
   northeastern: Collier, 18  
   Tertiary: Douglass, 03a  
 Museum collections: Woodward (A S), 90  
 Nebraska: Barbour, 15e; Leidy, 75; Osborn,  
   07d; Sioux Co.: Cook (H J), 12b, 15a  
 Nebraska and Wyoming: Peterson, 06c  
 Nevada, Cedar Mountain region: Merriam  
   (J C), 16; Virgin Valley and Thousand  
   Creek: Merriam (J C), 11c  
 New Jersey: Leidy, 56j  
   Cumberland Co., Miocene: Cope, 75l  
   greensand: Cope, 75n  
 New Mexico: Cope, 74d, 75c, 77  
   Eocene: Cope, 75b, 82a  
   San Juan Co.: Gilmore, 16  
 Niobrara: Cope, 77a; Loomis, 08c  
 Niobrara Valley: Leidy, 58  
 Nomenclature: Hay (O P), 99c, d; Matthew  
   (W D), 13a; of cranial elements in Per-  
   mian Tetrapoda: Gregory (W K), 17  
 North Carolina: Cope, 71q, 75g; Emmons (E),  
   58; Leidy, 56k  
   Chatham Co.: Leidy, 59e  
   Craven Co.: Croom, 34  
 Oklahoma, Permian Vertebrata: Case, 02  
 Opisthotonos: Moodie, 18d  
 Oregon: Leidy, 70g, 72b; Shufeldt, 13c  
   John Day region: Leidy, 73  
   Miocene: Cope, 79a  
 Origin: Cope, 85c  
 Osteological terms: Williston, 03d  
 Paired limbs, origin: Dean, 96b  
 Paleocene: Matthew (W D), 14  
 Panama, Gatun: Toulia, 09  
 Pennsylvania: Raymond (P E), 08a  
 Permian: Cope, 78g, w; Cope, 15; Hay (O P),  
   12d  
   catalog: Cope, 81j, 88c  
   Kansas: Williston, 98d  
 Permo-Carboniferous: Case, 15  
 Phylogeny: Cope, 84zb, 92d  
 Pineal eye: Cope, 88o  
 Pleistocene: Hay (O P), 17f  
 Pliocene fauna, western Nebraska: Matthew  
   (W D), 09e  
 Port Kennedy cave fauna: Cope, 71m, 95c, l,  
   99; Mercer, 99  
 Porto Rico: Reeds, 16a  
 Preparation of vertebrate fossils: Osborn, 01c  
 Preoccupied names: Hay (O P), 99e  
 Proboscidea, Pleistocene, occurrence: Udden,  
   05



## Vertebrata—Continued.

- Progress, recent: Eastman, 16  
 New Mexico, Puerco and Torrejon faunas: Gardner (J H), 10e  
 Puerco fauna: Cope, 82d, 83b, 88t  
 Quaternary cave deposit, California: Furlong, 07  
 Recapitulation, evidences for: Hussakof, 10  
 Rancho La Brea deposits: Matthew (W D), 16c  
 Recent advances: Moodie, 13b  
 Ribs, morphology: Baur, 87d  
 Rocky Mountain region: Osborn, 96a  
 Saskatchewan, Cypress Hills: Lambe, 05, 08  
 Miocene: Ami, 91a  
 Swift Current Creek: Cope, 85, 89a  
 Skeletons of fossil vertebrates, restoration of: Hay (O P), 09c  
 Skull, morphology: Baur, 89  
 Snake Creek beds, Nebraska: Matthew (W D) 18; Sinclair, 15  
 South Carolina: Tuomey, 48  
 Ashley phosphate beds: Leidy, 76a, 77  
 post-Pliocene: Holmes (F S), 59; Leidy, 60  
 South Dakota: Leidy, 69a  
 Badlands: Owen (D D), 50a; Williston, 95  
 Bijoux Hills: Leidy, 56c  
 Succession of vertebrate life: Marsh, 91e  
 Suessonian fauna: Cope, 77o  
 Sundry forms: Hatcher, 01a  
 Ten years' progress in vertebrate paleontology: Bassler, 12a  
 Tertiary: Cope, 78b, 84; Leidy, 73; Western States: Leidy, 71  
 Texas: Carpenter (W M), 46; Cope, 92; Hay (O P), 16a  
 Blanco beds: Cope, 92a  
 Harden Co.: Leidy, 68  
 Llano Estacado: Cope, 93  
 Permian: Cope, 82c, 83d, 84j  
 Theridont reptiles, genetic relations: Gregory (W K), 10a  
 Titanotheria, dolichocephaly and brachycephaly: Osborn, 08d  
 Triassic: Cope, 78g, 88f  
 Types of vertebrates in American Museum of Natural History: Hussakof, 08  
 in U. S. National Museum: Merrill (G P), 07c  
 in museum of University of Texas: Montgomery (T H), 04  
 Utah: Leidy, 70g; Wasatch beds: Cope, 72a  
 Vertebrae, evolution: Williston, 18; terminology: Wieland, 99a  
 Vertebrate paleontology, development: Lull, 18c  
 Virginia, Miocene: Leidy, 73c  
 Wasatch and Wind River faunas: Matthew (W D), 15a  
 Wasatch Eocene: Cope, 77o  
 Wyoming: Leidy, 69a; U P R C, 09  
 Bitter Creek: Cope, 73h, i  
 Converse Co.: Sternberg, 11  
 Eocene: Cope, 73, 82a  
 Lander, Triassic: Williston, 05b  
 Miocene: Sternberg, 13  
 Tertiary: Leidy, 72  
 Wind River beds: Cope, 81c

## Virginia.

- Alleghany Co.: Featherstonhaugh, 35b  
 Berkeley Spring: Hayden, 30  
 Bibliography: Watson (T L), 97a  
 Composition of waters of Rockbridge Co. and relations to the geological formations: White (A F), 06  
 Diatomaceous earth, Richmond: Anon, 80b  
 General: Cornelius, 19; Harlan, 31b; Hotchkiss, 73, 76; Kain, 18  
 Geologic survey, history: Rogers (W B), 84d; 1835-41: Hotchkiss, 82d  
 Natural Bridge: Gilmer, 18  
 Natural coke, Richmond: Stevens (R P), 74b  
 Oriskany drift: Curtice, 89  
 Pine Mountain region: Stone (R W), 07d  
 Saltville district: Lewis (H C), 81b  
 Soil geology: Kerr, 84a  
 State geologist, reports: Watson (T L), 10e  
 Subterranean temperature in coal mines: Rogers (W B), 43c  
 Western Va.: Britton (N L), 86  
*Economic geology.*  
 Anthracite: Griffith, 06; Tiffany, 06  
 Apatite deposits: Watson (T L), 13g  
 Appomattox Co.: Britton (J B), 81  
 Arsenic, Brinton: Cowan, 04; Hess, 11  
 Asbestos, Bedford region: Diller, 11  
 Augusta Co.: Campbell (J L), 83a  
 Barite deposits: Judd (E K), 07b; Watson (T L), 07c, 15  
 Bland Co., mineral resources: Farrow, 11  
 Blue Ridge, west side: Fontaine, 83b  
 Bristol quadrangle: Campbell (M R), 99a  
 Bristol-Big Stone Gap section: Boyd (C R), 87  
 Brock's Gap, Rockingham Co.: Campbell (J L), 80b  
 Brown iron ores as cavity fillings: Eckel, 13a  
 Bucu quadrangle, Va.: Hinds, 16  
 Building stone: Hawes, 84; Latrobe, 09; Watson (T L), 07e  
 Campbell Co.: Britton (J B), 81  
 Carbonite (natural coke): Wurtz, 75  
 Carroll Co.: Dickerson, 57  
 Cement materials: Bassler, 05, 05a, 07; Eckel, 13  
 Cumberland Gap district: Eckel, 06d  
 Valley of Virginia: Catlett, 04  
 western Va.: Bassler, 08a, 09  
 Chesapeake & Ohio Railroad route: Ridgway, 72  
 Clays: Ries, 06d, 07a  
 Coastal Plain: Watson (T L), 12a  
 Piedmont province: Ries, 17  
 Richmond district: Darton, 11  
 Clintwood quadrangle, Va.: Hinds, 16  
 Coal: Griffith, 06; Hotchkiss, 80a; Pa, Gen As, 34; Watson (T L), 07e  
 anthracite field: Tiffany, 06  
 Big Sandy basin: Althouse, 04  
 Big Stone Gap field: Campbell (M R), 93; Hodge (J M), 93; Pultz, 04  
 Botetourt Co.: Heinrich, 83  
 Bristol quadrangle: Campbell (M R), 99a  
 Buchanan Co.: Hinds, 18  
 Clinch Valley: McCreath, 93  
 Clintwood and Bucu quadrangles: Hinds, 16



## Virginia—Continued.

*Economic geology—Continued.*

Coal: Dante: Stone (R W), 07b  
 Dora field: Hotchkiss, 83  
 James River field: Coryell, 75; Lyell, 47  
 Pocahontas field: Fowler, 04  
 Pocket coal district in Little Black Mountain field: Fisher (C A), 09b  
 Pound quadrangle: Butts, 14, 14a  
 Powell field, Scott and Wise cos.: Campbell (M R), 11d  
 Powell Mountain, Scott Co.: Campbell (M R), 14  
 Quinnimont group, Tazewell Co.: Stevenson, 81f  
 Richmond field: Clifford, 88; Grammer, 18; Heinrich, 73, 79a; Marcou, 49; Newell, 89; Pierce, 26; Rogers (W B), 43a; Schmitz, 95; Shaler, 99a; Taylor (R C), 35c; Woodworth, 02, 02a; Wooldridge, 42  
 Russell Fork field: Stone (R W), 07a, 08  
 southwestern Va.: Killebrew, 89; Lesley, 62a, 73; Stevenson, 81c  
 Wise Co.: Bache, 95; McCreath, 92  
 Coastal Plain: Watson (T L), 12a  
 Copper: Watson (T L), 06d, 07e; Weed, 02e, 06a, 11  
 Carroll Co.: Hunt, 73e  
 Fauquier Co.: Jackson, 57c; Silliman (jr), 53  
 Floyd-Carroll-Grayson region: Currey, 59, 80  
 Greene Co.: Haney, 09  
 James River basin: Taber (S), 13  
 Luray: Phalen, 06a  
 southwestern Va.: Haney, 18; March, 57  
 Virgilina district: Judd (E K), 06; Laney, 11; Watson (T L), 02b  
 Cripple Creek district: Boyd (C R), 84; McCreath, 87a  
 Diatomaceous earth, Richmond: Coryell, 76  
 Emery: Watson (T L), 18e  
 Estillville quadrangle: Campbell (M R), 94  
 Feldspar: Watts (A S), 16  
 Floyd plateau: Fontaine, 83c  
 Fluorspar: Barton, 14a  
 Fork Run section, Alleghany Co.: Wickes, 80  
 Fredericksburg quadrangle: Darton, 94d  
 General: Ede, 92; Harrison (R), 85; Hotchkiss, 73, 81c; Pollard, 79; Rogers (W B), 36, 37, 38, 39, 40, 41, 42, 82b, 84  
 Gold: Credner, 66a; Dickson, 34; Henwood, 71; Johnson (W R), 51; Pratt, 02h; Silliman, 37b, c; Watson (T L), 07e  
 Brush Creek district: Fontaine, 82b  
 Fredericksburg region: Clemson, 35; Maury, 37; R10, 34a  
 James River: Taber (S), 13  
 southwestern Va.: Campbell (J L), 82  
 Granites: Watson, 07e, 10, 10a  
 James River valley: Campbell (J L), 82  
 Richmond district: Darton, 11  
 Graphite: Watson (T L), 07e  
 Grayson Co.: Boyd (C R), 97  
 Great Valley: McCreath, 83  
 Gypsum: Eckel, 04a; Watson (T L), 07e  
 Holston Valley: Robertson (W), 82; Stevenson, 85a

## Virginia—Continued.

*Economic geology—Continued.*

Gypsum: southwestern Va.: Eckel, 03c; Stose, 12, 13  
 Washington Co.: Rogers (H D), 55  
 Harpers Ferry quadrangle: Keith, 94  
 Highland Co.: Campbell (J K), 85  
 Infusorial earth: Rogers (W B), 59a; Tuomey, 43  
 Iron: Benton, 86a; Holden, 07; Pechin, 91; Rogers (W B), 80a; Springer (J F), 13  
 Appalachian region: Harder, 09a  
 Augusta Co.: Scamon, 82  
 Botetourt Co.: Beckwith, 80; Campbell (J L), 80a, c  
 Buena Vista, Rockbridge Co.: Pechin, 89  
 Craig Co.: Hotchkiss, 81b; Pechin, 92  
 Cumberland Gap: Moore (P N), 78b  
 Donald mine: Catlett, 00a  
 Floyd-Carroll-Grayson plateau: Currey, 80  
 gossan lead, southwestern Va.: Moxham, 93  
 Greenway belt, James River: Kimball, 81  
 hematite, Smyth Co.: Lyman, 68, 73a  
 James River district: Frazer, 83e; McDonald, 79  
 Lowmoor, Alleghany Co.: Chance, 00; Lyman, 86  
 magnetites, Franklin and Henry cos.: Nitze, 92  
 New River-Cripple Creek district: Holden, 06  
 Oriskany and Clinton ores: Eckel, 06c  
 Oriskany iron ore: Holden, 16; Weld, 15; Rich Patch mines: Campbell (J L), 80d, 81a; Pechin, 96  
 Page Valley: Prime, 80  
 Rich Hill: Dewey, 82  
 Roaring Run property: Hinsdale, 11  
 Rockbridge Co.: Hotchkiss, 81a  
 Valley of Virginia: Catlett, 00; McCreath, 83a  
 James River coal field: Lyell, 71a  
 James River valley: Campbell (J L), 80, 82  
 Lead: Watson (T L), 05, 06a, 07e; Wythe Co.: Köhler, 66  
 Lead and zinc deposits: Caldwell, 09; Watson (T L), 06a  
 Austin mines, southwestern Va.: Credner, 70a  
 southwestern Va.: Ball (S H), 16a  
 Wythe: Boyd (C R), 93a  
 Limestone: Eckel, 13; Watson (T L), 07e  
 Manganese deposits: Ball (S M), 09; Harder, 10; Hewett, 16, 16a; Mills (J E), 71  
 Crimora, Augusta Co.: Hall (C E), 91; Anon, 90e  
 Frederick Co.: Haney, 18a  
 Shenandoah Valley: Hewett, 18  
 Valley of Virginia: Catlett, 97  
 Map showing mines and quarries: Va G S, 09  
 Marble: Watson (T L), 07e  
 Massanutten Mountain: Spencer (A C), 95  
 Mineral resources: Egleston, 80; Froehling & Robertson, 04; McCreath, 83; Schubert, 09; Watson (T L), 07e, 09, 11a, 13, 13a; southwestern Va.: Hogg, 83  
 Monazite, Amelia Court House: Koenig, 82  
 Monterey quadrangle: Darton, 99  
 Natural coke: Hotchkiss, 83a  
 Chesterfield Co.: Raymond, 83



## Virginia—Continued.

*Economic geology*—Continued.

- Natural coke: eastern Va.: Rogers (W B), 42b, 54a  
 Mica: Watson (T L), 07e  
 New River-Cripple Creek mineral region: McCreath, 87  
 Nickel, Floyd Co.: Watson (T L), 07b  
 Page Valley: Prime, 80  
 Peat, Coastal Plain: Watson (T L), 12a; Dismal Swamp: Davis (C A), 11b  
 Phosphate, southwestern Va.: Stose, 14  
 Potomac basin, west of Blue Ridge: Hotchkiss, 82a  
 Potomac River coal field: Riordan, 82  
 Pyrite deposits: Fontaine, 82c; Watson (T L), 10f; Louisa Co.: Adams (W H), 84; origin: Nason, 94f  
 Pyrrhotite, southwestern Va.: Van Mater, 18  
 Richmond district: Darton, 11  
 Rock salt: Hayden (C B), 43  
 Rockbridge Co.: Ruffner, 89a  
 Rutile: Catlett, 07; Hess, 10e; Merrill (G P), 02b; Watson (T L), 07e, 10c, 14; Anon, 09a  
 St. Mary's quadrangle: Shattuck, 06a  
 Salt: Taylor (S), 41; Watson (T L), 07e  
   Holston Valley: Robertson (W), 82; Stevenson, 85a  
   southwestern Va.: Eckel, 03c; Stose, 12a, 13; origin: Thomas (K), 18  
   Washington Co.: Rogers (H D), 55  
 Sand: Watson (T L), 07e; Coastal Plain: Watson (T L), 12a  
 Shenandoah Valley: Hotchkiss, 80b, 81, 82; McCreath, 83  
 Silver: Watson (T L), 07e  
 Slate: Dale, 06c; Watson (T L), 07e  
   northeastern Va.: Watson (T L), 11e  
   Snowden, Amherst Co.: Campbell (J L), 84c  
 Soapstone: Watson (T L), 07e  
 Southern Va.: Hotchkiss, 80d  
 Southwestern Va.: Boyd (C R), 77, 81; Currey, 80; Ruffner, 80  
   geologic map: Boyd (C R), 83  
   mineral resources: Stevenson, 82b  
 Staunton quadrangle: Darton, 94e  
 Sulphur: Springer (J F), 13  
 Talc: Watson (T L), 07e  
 Tazewell quadrangle: Campbell (M R), 97  
 Tellurium ore, Whitehall: Jackson, 50e  
 Tin: Watson (T L), 07e; Winslow, 85a  
   Irish Creek, Rockbridge Co.: Brown (W G), 84; Ferguson (H G), 18, 18a  
   Vesuvius: Ulke, 94  
 Titanic iron ores, microstructure: Warren (C H), 18  
 Titanium deposits: Watson (T L), 13g  
 Virgilina district: Judd (E K), 06; Laney, 11, 17  
 Zinc: Caldwell, 09; Payne (C A), 04; Watson (T L), 05, 06a, 07e  
   Bertha: Case, 94  
   southwestern Va.: Higgins, 05  
 Zircon-bearing pegmatites: Watson (T L), 16a  
 Zirconiferous sandstone, Ashland: Watson (T L), 12e, 13f

*Historical geology*.

- Abingdon quadrangle: Stose, 14  
 Appalachian Mountains: Campbell (J L), 79a  
 Appalachian region: Darton, 92c

## Virginia—Continued.

*Historical geology*—Continued.

- Appalachian Valley: Watson (T L), 05  
 Balcony Falls: Campbell (J L), 79b, 84; Potsdam: Campbell (H D), 85  
 Basalt dikes, Highland Co.: Darton, 90a  
 Big Stone Gap coal field: Campbell (M R), 93  
 Bland, Giles, Wythe, Pulaski, and Montgomery cos.: Stevenson, 87  
 Blue Ridge: Campbell (J L), 79b; Clemson, 35; Fontaine, 75; Watson (T L), 15a  
   James River Gap: Campbell (J L), 84b  
   west side: Fontaine, 83b  
 Boring, Fort Monroe: Fontaine, 82a  
 Botetourt Co.: Campbell (J L), 80a  
 Buchanan Co.: Hinds, 18  
 Bristol quadrangle: Campbell (M R), 99a  
 Bristol- Big Stone Gap section: Boyd (C R), 87  
 Bucu quadrangle, Va.: Hinds, 16  
 Cambrian: Fontaine, 75a; Walcott, 92b; and Ordovician: Bassler, 07  
 Cambro-Ordovician, Valley of Virginia: Campbell (H D), 05  
 Carboniferous: Fontaine, 77; Stevenson, 87c, 04  
 Catoctin belt: Keith, 94a  
 Cenozoic: Darton, 93d, 94g  
 Central Va.: Campbell (J L), 79  
 Central western Va.: Watson (T L), 13c  
 Clintwood quadrangle: Hinds, 16  
 Coal rocks, eastern Va., age: Rogers (W B), 43a  
 Coastal Plain: Berry, 12; Clark (W B), 06d, 12b  
 Cobblestone deposits: Rogers (W B), 75a  
 Columbia formation: Darton, 93d; McGee, 93i; Salisbury, 93c  
 Craig Creek basin, Craig Co.: Hotchkiss, 81b  
 Cretaceous formation: Berry, 09e; Clark (W B), 07; Norfolk: Darton, 98d  
 Crystalline rocks: Hitchcock (C H), 82  
 Devonian and Mississippian: Williams (H S), 05  
 Dikes, felsophyre and basalt: Darton, 98b  
 Eastern Va.: Clark (W B), 90; Darton, 91b; Pierce, 26  
 Eocene: Clark (W B), 96a; Conrad, 35b; Harris, 94a; Lyell, 45b  
 Erosion intervals in Tertiary: Miller (B L), 10  
 Estillville quadrangle: Campbell (M R), 94  
 Floyd plateau: Fontaine, 83c  
 Fork Run section, Alleghany Co.: Wickes, 80  
 Franklin quadrangle: Darton, 96c  
 Fredericksburg quadrangle: Darton, 94d  
 Fredericksburg region: Taylor (R C), 35d  
 Fredericksburg sandstone: Rogers (W B), 42e  
 General: Campbell (J L), 83b, 85; Clark (W B), 95b; Clemson, 35; Cope, 68e; Credner, 66; Darton, 96d; Harrison (R), 85; Hotchkiss, 76, 81c; Latrobe, 09; Pollard, 79; Rogers (W B), 36, 37, 38, 39, 40, 41, 42, 82b, 84  
 Geologic map: Hotchkiss, 80e; Rogers (W B), 75b; Watson (T L), 11  
 Gold belt, James River: Taber (S), 13  
 Grayson Co.: Boyd (C R), 97  
 Great Valley: McCreath, 83  
 Greensand deposits: Ashley, 17a  
 Harpers Ferry quadrangle: Keith, 94



## Virginia—Continued.

*Historical geology*—Continued.

- Highland Co.: Campbell (J K), 85; Hotchkiss, 85
- Infusorial deposit, Richmond: Stodder, 76
- Infusorial stratum, limits: Rogers (W B), 43d
- Irish Creek: Ferguson (H G), 18, 18a
- James River coal field: Lyell, 47, 71
- James River valley: Campbell (J L), 80, 82
- Lafayette formation: Darton, 92b
- Lec Co.: Stevenson, 81c
- Lee, Wise, Scott, and Washington cos.: Stevenson, 81d
- Little North Mountain section, Augusta Co.: Campbell (J L), 84a
- Lower Carboniferous: Rogers (W B), 59d
- Lower Helderberg limestone: Hotchkiss, 84
- Massanutten Mountain: Spencer (A C), 95, 97
- Mesozoic: Fontaine, 79, 81, 83; Rogers (W B), 54, 55b
- Metamorphic strata: Rogers (H D), 57
- Miocene: Lyell, 45a; James River valley: Olsson, 14
- Mississippian delta: Branson, 12
- Monterey quadrangle: Darton, 99
- Montgomery and Pulaski cos., Paleozoic overlaps: Campbell (M R), 94a
- Monticello area: Lambeth, 01
- Mount Vernon: Darton, 15c
- Murfreesboro stage of east coast Miocene: Olsson, 17
- New River-Cripple Creek mineral region: McCreath, 87
- Nomini quadrangle: Darton, 96a
- Norfolk quadrangle: Darton, 02
- Onondaga formation: Kindle, 12
- Ordovician, Buckingham Co.: Darton, 92d
- Piedmont: Bassler, 18a, b
- Roanoke Co.: Powell (S L), 15
- southwestern Va.: Powell (S L), 14
- Piedmont limestones: Mathews, 09a
- Piedmont slates, age: Watson (T L), 11e
- Pocahontas quadrangle: Campbell (M R), 96a
- Pocahontas region: Boyd (C R), 95
- Pocahontas section, Tazewell Co.: Lathrop, 84
- Potomac basin, west of Blue Ridge: Hotchkiss, 82a
- Potomac formation: Fontaine, 88, 96
- Potomac River section, Eocene: Clark (W B), 96
- Potomac Valley: McGee, 89
- Pound quadrangle: Butts, 14, 14a
- Powell Mountain coal field, Scott and Wise cos.: Campbell (M R), 11d
- Primordial: Fontaine, 75a
- Quantico slate belt: Watson (T L), 10b
- Richmond district: Darton, 11; Heinrich, 79a; Rogers (W B), 54a, 81; Shaler, 73a, 99a; Woodworth, 02a
- Richmond coal, age: Rogers (W B), 42e
- Richmond coal field: Heinrich, 73; Marcou, 49; Newell, 89; Rogers (W B), 43a; Schmitz, 95; Shaler, 71; Taylor (R C), 35c
- Richmond coal field shales, age: Berry, 12e
- Rich Patch Mountain, Iron Gate: Schmitz, 96
- Rock emery area, Pittsylvania Co.: Watson (T L), 18e

## Virginia—Continued.

*Historical geology*—Continued.

- Rockbridge Co.: Ruffner, 89a; Irish Creek: Ferguson (H G), 18, 18a
- St. Mary's quadrangle: Shattuck, 06a
- Saltville Valley: Fontaine, 81a
- Scott County: Stevenson, 81c
- Sections: Taylor (R C), 35d
- Shenandoah Co.: Hotchkiss, 82
- Shenandoah limestone, subdivisions: Bassler, 05b
- Shenandoah Valley: Barton, 14a; Hotchkiss, 81; McCreath, 83
- Southwestern Va.: Boyd (C R), 77, 81; Credner, 70a; Lesley, 62a, 84a; White (D), 05c; geologic map; Boyd (C R), 83
- Staunton quadrangle: Darton, 94e
- Table of formations: Rogers (W B), 80
- Tazewell, Russell, and Wise cos.: Lesley, 73
- Tazewell, Russell, Wise, Smyth, and Washington cos.: Stevenson, 85a
- Tazewell quadrangle: Campbell (M R), 97
- Tertiary: Heilprin, 84, 84a; Lyell, 42c; Rogers (H D), 37, 39a; Rogers (W B), 59a
- erosion intervals: Miller (B L), 10
- post-Eocene: Heilprin, 82b
- Tertiary marl, lower Va.: Rogers (W B), 84a
- Vespertine strata: Fontaine, 77
- Virgilina district: Laney, 17
- Washington quadrangles: Darton, 01
- Western Va.: Bassler, 09
- Wise Co.: Stevenson, 81c
- York River region: Lincoln, 85
- Yorktown: Clark (W B), 93c
- Mineralogy.*
- Albite, Amelia: Becke, 00
- Allanite: Watson (T L), 17; Bedford Co.: Page, 82
- Amelia Co.: Fontaine, 83a; pegmatites: Watson (T L), 16a
- Amelia Court House: Gordon (S G), 18
- Anatase, Buckingham Co.: Williams (G H), 91c
- Calcite from Virgilina: Pogue, 09
- Cassiterite, Irish Creek, Rockbridge Co.: Brown, (W G), 84
- Dufrenite, Rockbridge Co.: Campbell (J L), 81, 81b
- Feldspar aggregate, Nelson Co.: Thornton, 11
- Fluorspar: Barton, 22a
- Helvite, Amelia Court House: Lewis (H C), 82a, k; Sloan, 82
- Iron accompanying native gold, Montgomery Co.: Page, 82a
- Limonite, Roanoke Co.: Mallet, 75
- Meteorite, Augusta Co.: Campbell (H D), 03; Kunz, 86f, 87a; Mallet, 71, 78a
- Botetourt Co.: Cohen, 92; Shepard, 66b
- Chesterfield Co.: Shepard, 29; Cocke, 29
- Floyd Mountain: Kunz, 91c
- Henry Co.: Venable, 90
- Indian Valley, Floyd Co.: Kunz, 92b
- Jenny's Creek, Wayne Co.: Kunz, 86m
- Louisa Co.: Howell (E E), 91
- Staunton, Augusta Co.: Cohen, 91, 92
- Minerals: Froehling & Robertson, 04
- Niobium mineral, Amherst Co.: Brown (W G), 77



## Virginia—Continued.

*Mineralogy*—Continued.

- Orthite, Amelia Court House: Koenig, 82a  
 Owenite, Harper's Ferry: Genth, 53b  
 Phenacite: Yeates, 90  
 Pyrolusite, Shenandoah Co.: Watson (T L), 18d  
 Quartz twin, Albemarle Co.: Brown (W G), 85  
 Rock crystal: Kunz, 87n  
 Rutile and cyanite: Watson (T L), 11f  
 Sipylite, Amherst Co.: Mallet, 77, 81  
 Strengite, Rockbridge Co.: Koenig, 77e  
 Telluric bismuth: Jackson, 50i  
 Tetradymite, Whitehall: Jackson, 51h  
 Tourmaline, radiated, Nelson Co.: Martin (D S), 15  
 Tscheffkinite, Bedford Co.: Eakins, 91  
 Turquoise, crystallized: Schaller, 12, 12a  
 Wolframite, Irish Creek, Rockbridge Co.: Brown (W G), 84

*Paleontology*.

- Amphibian footprints, Mississippian: Branson, 10  
 Anthozoa, Eocene: Vaughan, 95b  
 Arcas: Sheldon, 17  
 Balaena: Leidy, 51c  
 Batocrinus, Flag Pond: Rowley, 91d  
 Carcharodon mortoni: Lucas (F A), 92  
 Cave mammals: Cope, 69g  
 Coal field flora: Stur, 88  
 Coprolite, Richmond: Wyman, 50e  
 Cretaceous floras: Berry, 09e; Schizaeaceae: Berry, 11d  
 Crocodile, Miocene: Leidy, 52c; Westmoreland Co.: Leidy, 51b  
 Crustacea, Yorktown: Van Rensselaer, 25a  
 Delphinus, Miocene: Leidy, 52f  
 Devonian and Mississippian: Williams (H S), 05  
 Diatomaceae, Richmond: Stodder, 76  
 Dismal Swamp Mollusca and diatoms: Woolman, 98  
 Dog (Pachycyon), Ely Cave, Lee Co.: Allen (J A), 85  
 Eocene: Conrad, 47; Lyell, 45b; middle Atlantic slope: Clark (W B), 95d  
 Eurypterid, Lyons Gap: Shuler, 15  
 Fishes, Richmond field: Redfield, 53; Wyman, 50c  
 Fulgur: Conrad, 53  
 Infusoria: Bailey (J W), 45c, d; Ehrenberg, 44; Petersburg: Bailey (J W), 43, 44; Richmond: Stodder, 76  
 Infusorial deposit, Fort Monroe well: Rogers (W B), 82  
 Istiophorus calvertensis, Miocene: Berry, 17f  
 James River coal field: Lyell, 47; plants: Bunbury, 47  
 Lafayette fauna: Darton, 92b  
 Leidyotherium, Abingdon, Va.: Prout, 60a  
 Lignite, eastern Va.: Rogers (W B), 55a  
 Mammalian remains, Richmond: Wyman, 50a  
 Mammoth, Wythe Co.: Madison (B), 06  
 Megalonyx: Cooper (W), 36; Cuvier, 04; Jefferson, 99; Wistar, 99  
 Mesozoic flora: Fontaine, 83

## Virginia—Continued.

*Paleontology*—Continued.

- Miocene: Olsson, 16; Mathews Court House: Martin (D S), 74c  
 cypress swamp: Berry, 08c  
 flora: Berry, 09  
 Invertebrates, Yorktown: Meyer (O), 88  
 marine Vertebrata: Cope, 95d, 96b  
 Mollusca: Conrad, 66b, 68, 68a, 69b, d  
 Mollusca: Conrad, 71b  
 Eocene, James River: Tuomey, 42  
 Neocene: Olsson, 14  
 Tertiary: Conrad, 44, 67f  
 Neocalamites, Richmond Triassic: Berry, 12a  
 Nut, Eocene marl: Ruffin, 50  
 Ordovician: Rogers (W B), 82a; Buckingham Co.: Darton, 92d  
 Phoca: Leidy, 56m  
 Pisces, Bethany: Leidy, 59c; Miocene, Westmoreland Co.: Cope, 69a  
 Plantae, Alleghany Co.: Meek, 80  
 Fredericksburg region: Taylor (R C), 35d  
 Pleistocene: Berry, 06h; Blue Ridge: Berry 12d  
 Pleistocene swamp deposits: Berry, 09d  
 Potomac flora: Ward (L F), 05  
 Potomac group plants, revision: Berry, 10f, 11f  
 Prorosmarus alleni, Miocene: Berry, 06a  
 Protozoa, Eocene: Bagg, 95  
 Recurrence in Chemung fauna: Kindle, 11a  
 Seals, Richmond: Wyman, 50e  
 Septastraea (Glyptastraea), Tertiary: Hinde, 88a  
 Tertiary: Conrad, 34a, 43a; Heilprin, 84; Rogers (H D), 37; Mollusca: Lea (H C), 43, 46  
 Triassic: Gabb, 60a; flora: Marcou, 90a  
 Vertebrates, Miocene: Leidy, 73c; Saltville Valley, Smyth Co.: Peterson, 17a  
 Walrus: Cope, 74n; Accomac Co.: Mitchill, 27  
 Wood, Richmond Basin: Knowlton, 99a  
 Yorktown fauna: Gardner (J A), 15
- Petrology.*  
 Basalt, Blue Ridge: Watson (T L), 15a  
 Basalt dikes, Pendleton Co.: Darton, 90a  
 Blue Ridge region: Watson (T L), 16  
 Central western Va.: Watson (T L), 13c  
 Diabase, Chatham: Watson (T L), 98, 99a  
 Dike of diabase in Potsdam sandstone: Watson (T L), 07a  
 Dikes, felsophyre and basalt: Darton, 98b  
 Dikes, Shenandoah Valley: Watson (T L), 13c  
 Gold belt, James River: Taber (S), 13  
 Granites: Watson (T L), 06b, 10a  
 Hypersthene syenite, Blue Ridge: Watson (T L), 16  
 Igneous complex, Amherst-Nelson cos.: Watson (T L), 13i  
 Mesozoic igneous rocks: Campbell (H D), 91  
 Nelsonite: Watson (T L), 10d  
 New rock types: Watson (T L), 13h  
 Spinellite: Watson (T L), 18e  
 Unakite: Watson (T L), 06c; Luray: Phalen, 04a  
 Virgilina district: Laney, 17; Watson (T L), 02b  
 Zircon-bearing pegmatites: Watson (T L), 16a



## Virginia—Continued.

*Physical geology.*

- Allanite, weathering: Watson (T L), 17  
 Blue Ridge: Keith, 92a  
 Bristol quadrangle: Campbell (M R), 99a  
 Currituck Sound: Wieland, 97a  
 Earthquake, April 9, 1918: Watson (T L), 18  
   Buckingham Co.: Taber (S), 13b  
   Giles Co.: Campbell (M R), 98b  
 Ely Cave, Lee Co.: Shaler, 85a  
 Estillville quadrangle: Campbell (M R), 94  
 Faulting, Piedmont Cambrian: Watson (T L), 13d  
   southwestern Va.: Squier, 84; Stevenson, 87b  
 Helictites, Luray cave: Dolley, 87  
 Luray cave, Page Co.: Ammen, 82; Ashburner, 84c; Lusk, 86; Anon, 81  
 Massanutten Mountain: Spencer (A C), 97  
 Metamorphism, Prince William Co.: Rogers (W B), 55c  
 Natural Bridge: Ashburner, 84c, 85c; Walcott, 93a  
   Rockbridge Co.: Featherstonhaugh, 32b  
   Scott Co.: Long, 32  
 Overlaps, Montgomery and Pulaski cos.: Campbell (M R), 94a  
 Richmond Basin: Shaler, 99a  
 Saltville Valley fault: Fontaine, 81a  
 Sand hills, Cape Henry: Latrobe, 99  
 Staunton cave-in: Kindle, 11b; Van Horn (F B), 10  
 Staunton quadrangle: Darton, 94e  
 Travertine, Alleghany Co.: Featherstonhaugh, 35b  
 Weathering of gneiss, Albemarle Co.: Merrill (G P), 97b

*Physiographic geology.*

- Blue Ridge: Davis (W M), 03b; origin: Davis (W M), 03f  
 Bristol quadrangle: Campbell (M R), 99a  
 Camp Lee region: Giles, 18  
 Coastal Plain: Clark (W B), 12b  
 Dismal Swamp: Davis (C A), 11b; Shaler, 90; Shaw (E W), 11h  
 Drainage, Tertiary changes: Campbell (M R), 94b  
 Drift deposits, Richmond: Wallace (C M), 76  
 Eastern Va.: Giles, 18  
 Estillville quadrangle: Campbell (M R), 94  
 Fredericksburg quadrangle: Darton, 94d  
 General: Kerr, 84a  
 Glacial phenomena: Stevens (R P), 73a  
 Gold belt, James River: Taber (S), 13  
 Jackson River, Bath and Alleghany cos.: Baskerville, 92; Cobb, 93a  
 Langley field, Hampton quadrangle: Stephenson, 18a  
 Massanutten Mountain: Spencer (A C), 95  
 New River district, Mississippian delta: Branson, 12  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Shenandoah Valley, drainage changes: Watson (T L), 13e  
 Southwestern Va.: Campbell (M R), 94b; Stevenson, 87a  
 Surface geology, southwestern Va.: Stevenson, 87a

## Virginia—Continued.

*Physiographic geology—Continued.*

- Stream piracy, western Va.: Watson (T L), 14a  
 Tazewell quadrangle: Campbell (M R), 97  
*Underground water.*  
 Coastal Plain province: Sanford, 13  
 General: Darton, 96d, 05f  
 Manassas, underground waters: Clapp (F G), 11c  
 Mineral springs: Rogers (W B), 84b  
 Thermal springs, relation to anticlines and faults: Rogers (W B), 43b  
 Water-bearing horizons: Darton, 95a  
 Virgin Islands: Cleve, 71; littoral physiographic features: Vaughan, 16c  
 Virgin Valley beds, Nev.: Merriam (J C), 07a; mammals: Gidley, 08a  
*Volcanic ash.*  
 Alaska, Kodiak: Fry, 12  
   Nabesna-White River district: Moffit, 10a  
   Seward Peninsula: Smith (P S), 12c  
   Unalaska: Diller, 85  
   Yukon basin: Capps, 15  
 Colorado: Montgomery (H), 95; Durango: Woolsey, 06  
 Dominica: Wadsworth, 80d  
 General: Buttram, 14  
 Guatemala: Diller, 02g; Santa Maria: Bergeat, 03a  
 Kansas: Udden, 98d; Williston, 92b; Moberly Co.: Harnly, 95  
 Mexico, Colima: Sperry, 03  
   Guanajuato: Wittich (E), 10f  
   San Cristobal: Schmidt, 03; Schottler, 03  
 Montana: Rowe, 03, 08  
 Mont Pelé: Griffiths, 03  
 Nebraska: Barbour, 97b, 98d, 02, 16a  
   Omaha: Todd, 92a, 95c  
   Republican River Valley: Condra, 07  
   southwestern: Merrill (G P), 85d; Salisbury, 96e  
 Oklahoma: Buttram, 14; Gould 08d, 10c; Williston, 92b  
 Origin: Hixon, 07b  
 St. Vincent, La Soufrière: Coppock, 03; Diller, 02c; Flett, 02  
 South Dakota: Wadsworth, 85c  
 Texas: Dumble, 92f, 95a  
   Dickens Co.: Turner, 95d  
   Kent Co.: Udden, 13  
 Utah, Montgomery (H), 95  
 West Indies: Bonney, 03c; Falconer, 02a; Porter (T C), 02; Teall, 02  
 Wyoming, Bridger beds: Sinclair, 06a; Laramie and Sherman quadrangles: Darton, 10c  
 Volcanic dust, relation to ice ages: Humphreys, 13  
 Volcanic dust veils: Arctowski, 15  
*Volcanic necks.*  
 Arizona, northern: Darton, 10a  
 Examples of: Ordóñez, 05e  
 New Mexico, northwestern: Darton, 10a  
 Volcanic rocks. *See* Igneous and volcanic rocks.  
 Volcanic topography: Smith (E M), 09  
 Volcanic tuffs: Pirsson, 15a



**Volcanism.** *See also* Volcanoes.

- Antilles type of eruptions: Supan, 02  
 Argon in gas of fumaroles, Guadeloupe: Moissan, 04  
 Ascent of lava: Perret, 13h  
 Australites: Moore (E S), 16  
 Brun's new data: Winchell (A N), 12  
 Cause: Barus, 06; Dutton, 84b, 89a; Hunt, 73f, 75; Hixon, 05a, 11; Louderback, 06; Meunier, 16a; Moore (E S), 15; Rice (W N), 97; Richthofen, 68a; See, 06a; Winslow, 57a  
 Climate affected by eruptions?: Abbot (C G), 13  
 Conditions of eruptions: Perret, 08  
 Craters, form: Brigham (W T), 68a; types: Sapper, 94a  
 Curves illustrating coincident volcanic, seismic, and solar phenomena: Huntington, 08  
 Eruption centers, regularity of intervals: Friedlaender, 18  
 Explosion craters: Darton, 16b  
 Fumaroles, production of sulphate of soda in: Lacroix, 05c  
 Gaseous emanations: Day (A L), 16b  
 General: Barus, 07; Buttram, 14; Carter, 09; Comstock, 86b, 87d; Dana (J D), 50, 73e; Dutton, 80; Hilgard (T C), 69, 74a; Hill (R T), 05; Hobbs, 09; Hovey, 09a; Howell (E E), 75; Hunt, 58a; Iddings, 14; Jaggar, 07a, 10; Pickering, 07; Rockwood, 85, 86, 89; Russell, 96b; Stevens (B), 13; Whitney, 71a; Wilson (J F), 10  
 Genesis and conservation: Pike, 85  
 Hawaiian Islands, arrangement of volcanoes: Powers, 17  
 Index of danger from volcanoes: Jaggar, 18  
 Magmatic gases: Meunier, 14  
 Magmatic waters and volcanic action: Hixon, 08c  
 Mud flows: Lacroix, 03h  
 Pacific coast: Diller, 99c  
 Peleliths: Winchell (N H), 04b  
 Pele's tears: Moore (E S), 16  
 Radioactivity, relation to volcanism: Dutton, 06  
 Research at Kilauea, 1911: Perret, 13g  
 Salvador: Sapper, 96b  
 Seat of volcanic action: Hunt, 69  
 Seismic phenomena, connection with volcanism: Heilprin, 06f, j  
 Sun spots, relation to seismic and volcanic phenomena: Poey, 74  
 Tuff cone eruptions, brevity of: Bishop, 01  
 United States, western: Comstock, 86b  
 Utah, high plateaus: Dutton, 80  
 Volcanic action: Dana (J D), 87; nature of: Daly (R A), 11a  
 Volcanic activity, origin: Moore (E S), 15  
 Volcanic cones, form: Becker, 85c  
 Volcanic craters and explosions: Anderson (T), 12  
 Volcanic domes, formation: Lacroix, 05  
 Volcanic gases: Clarke (F W), 08; Sainte-Claire Deville, 67a

**Volcanism—Continued.**

- Volcanic heat, nature and origin: See, 06c; Thomson, 06  
 Volcanic mechanism: Washington, 17  
 Volcanic phenomena, diagrammatic representation: Perret, 14  
 Volcanic springs, Colorado Desert, Cal.: LeConte (J L), 55  
 Volcanic waters: Hastings, 08b  
 Volcanism and thermal waters: Gautier, 06  
 Water and magmatic gases: Day (A L), 13a  
 Water and volcanic activity: Day (A L), 13  
 Western hemisphere, volcano systems: Hill (R T), 02f

**Volcanoes.** *See also* Volcanism.

- Age as the determinant of character: Curtis, 15b  
 Aguafria and Jarapeo, Mexico: Ramírez, 73  
 Alaska: Cordeiro, 10; Crosby, 07a; Dall, 18; Perrey, 66  
 Bogoslof: Davidson (G), 84a; Eakle, 08; Jaggar, 08a; Merriam (C H), 02, 02a; Powers, 16c; Smith (P S), 08a; Anon, 84e  
 Katmai eruption: Clark (G A), 12; Dailey, 12; Anon, 12g; Katmai: Griggs, 18, 18a; Martin (G C), 13a; Ten Thousand Smokes: Griggs, 18b; Ten Thousand Smokes valley, hot mud flow: Griggs, 18c  
 Mount St. Augustin, eruption: Davidson (G), 84  
 Antilles: McGee, 02; Montessus, 02; Lesser: Hovey, 15c; eruptions, 1902-3: Sapper, 04a  
 California: Hague, 83  
 Ceboruco, Mexico: Bárcena, 75; Caravantes, 70; Iglesias, 77; Kunhardt (F), 70; Matute, 75; Ordóñez, 98a  
 Central America: Bertrand, 99; Montessus de Ballore, 84, 88; Sapper, 01, 04c, 05, 11, 13; Seebach, 92; Squier, 50; distribution: Sapper, 97a  
 Citlaltapetl (Orizaba): Angermann, 04c; Keyes, 07e  
 Classification of active volcanoes: Jaggar, 10b  
 Colima, Mexico: Arreolo, 03; Bárcena, 87; Böse, 02; Chrustschoff, 86; Díaz, 07; Dollfus, 67c; Hovey, 07f, 08e; Ishikawa, 04; Köhler, 06; Kunhardt (T), 69; Ordóñez, 98a, 03; Puga, 90; Sabatini, 08; Sartorius, 71; Sperry, 03; Waitz, 06b, 15; catalog of eruptions: Arreola, 15  
 Cosiguina, Nicaragua: Crawford (J), 92a; eruption, 1835: Galindo, 35  
 Cosiguina, eruption, Salvador: Caldeleugh, 36  
 Costa Rica: Dutton, 91a; Frantzius, 61; González Viquez, 10; Jaggar, 11, 11a; Jones (J O), 03; Pittier, 10  
 Dominica, boiling lake of: Hovey, 06i; eruptions, 1911: Reid (H F), 12d  
 General: Abbot (C G), 13a; Anderson (T), 17; Buttram, 14; Cooper (T), 22; Dana (J D), 56, 90; Day (A L), 16a; Du Commun, 29; Green (W L), 90; Haskins, 69; Hayes (J L), 44; Hunt, 70h; Jaggar, 18a; Owen (R), 72a; Shaler, 88e; Silliman, 28; Stübel, 03  
 Guatemala: Anderson (T), 08a, 09; Ascoli, 09; Burkart, 69b; Dollfus, 68; Sapper, 93, 00, 18



## Volcanoes—Continued.

Hawaii: Brigham (W T), 68, 69; Coan, 57a, 69, 70a, 74a; Daly (R A), 10c; Dana (J D), 49, 50, 50f; Dutton, 83a, 84; Green (W L), 84, 90; Hawaiian Vol Obs, 14; Hitchcock (C H), 06b, c, 09; Jaggar, 12a, 13, 13a, 16, 18a; Kneeland, 73; Komorowicz, 12; Moore (E S), 15; Pickering, 71a, 06; Powers, 15c; Williamson, 69; Wood (H O), 13

Halemaumau: Dana (J D), 89; Powers, 16c; collapse: Jaggar, 16c

Kilauea: Bishop, 92; Brigham (W T), 67, 87, 91, 09; Coan, 54, 56, 63, 64, 67, 70, 71, 79, 80, 10; Crampton, 10; Curtis, 13; Day (A L), 13; Dana (J D), 68, 86b, 87, 87a, 91a; Day (A L), 13, 14a, 15b; Dodge, (F S), 87, 83; Emerson (J S), 87; Hitchcock (C H), 87a, 08a, 09a; Forbes, 15; Friedlaender, 96; Hawaiian Vol Obs, 14; Jaggar, 15b, 17a; Keep, 93; Lyman (C S), 49, 51; Mann, 66; Penck, 12; Powers, 15b; Stewart (C S), 26; Thurston, 94; Van Slyke, 87

aa lava: Jaggar, 17b

cyclical variation in eruption: Wood (H O), 17b

ejectamenta: Perret, 13d

explosive ejectamenta: Powers, 16b

floating islands: Perret, 13a

formations in crater: Perret, 13e

lava fields: Heim, 13

lava fountains: Perret, 13

lava lake: Perret, 13b

relief model: Daly (R A), 18b; Sayles, 17, 18

subsidence phenomena: Perret, 13c

lava flows: Coan, 56b

Maui: Alexander (J M), 74; Dana (J D), 89a

Mauna Loa: Alexander (J M), 88; Baker (E P), 89; Bishop, 87; Brigham (W T), 68b, 88, 09; Coan, 52, 52a, 53, 56a, 57, 71, 72, 73, 74, 77, 80, 81, 81a; Dana (J D), 52b, 56, 59a, 68, 87b, e; Day (A L), 17a; Friedlaender, 15; Green (W L), 59; Haskell, 59; Hitchcock (C H), 00c; Jaggar, 15, 15a, 16b; Lyman (H M), 59, 59a; Merritt, 89; Miller (W), 56, 56a; Powers, 15b; Weld, 57; Wood (Ed), 99, 04

craters: Alexander (J M), 86

eruption, 1916: Wood (H O), 17

Kahuku flow: Wood (H O), 16c

lava flow, 1916: Jaggar, 17

Mokuaweoweo: Wood (H O), 16

Hawaiian volcano museum, proposed: Jaggar, 16a

Independence from pre-existing faulting: Böse, 00

Irazú, Costa Rica, eruptions: Calvert, 18; Tristán, 17

Izalco, San Salvador: Gosling, 97; Koep, 69; Sapper, 03a, 04, 04b

Jorullo, Mexico: Burkart, 35, 39, 57; Felix, 88; Hobson, 07; Ordóñez, 06e; Saussure, 59

Jorullo and Ceboruco, descending clouds: Waitz, 15

Kilauea. *See* Hawaii, *above*.

Las Pilas, Nicaragua: Sapper, 99a

## Volcanoes—Continued.

Lassen Peak, Calif.: Boerker, 15; Boyce, 14; Diller, 93a, 95, 14b, c, 15c, 16a, b; Dutton, 85b; Holway, 14a, 15, 15a; Palmer (A H), 16a; Sapper, 18a; Storms, 14; Wright (W H), 14; volcanic history: Diller, 16

Masaya, Nicaragua: Sapper, 04, 14, 16

Massive solid eruptions: Russell, 04a

Mauna Loa. *See* Hawaii, *above*.

Mexico: Aguilera, 07a, b; Brigham (W T), 71a; Burkart, 70c; Cadell, 07; Cleland, 07a; Dannenberg, 08; Hobson, 07a; Freudenberg, 09; Humboldt, 54; Inkey, 08; Melgareio, 10; Pieschel, 55, 56; Virlet d'Aoust, 66

distribution: Sapper, 93a

Puebla: Ordóñez, 05d

Valley of Santiago: Ordóñez, 00b; explosion craters: Ordóñez, 06f

Miravalles, Costa Rica: Peralta, 14; Tristán, 14

Mont Pelé, Martinique: Anderson (T), 02, 03, 03a, 07, 08, 10; Bergeat, 02; Berté, 02; Curtis, 03a; Deckert, 02, 03; Divers, 02; Geinitz, 02; Gerland, 02; Heilprin, 02, 03, 03a, b, 08; Hill (R T), 02c, 05; Hovey, 02f, 03e, h, j, 04j, 05f; Issel, 02; Jaggar, 02, 02a, 03, 04b; Kewitsch, 02; Lacroix, 02c, f, g, h, j, 03b, e, i, 04, 07; Lapparent, 05; Lévy, 02a; Milne, 03; Nicholls, 02; Russell, 02b, c; Sapper, 03j, 05; Stübel, 04; Thierry, 02, 02a; Verri, 05; Verrill, 02; Wegener, 03, 03a, 04

eruption, 1851: Jaggar, 04

eruption of black clouds: Lacroix, 03a

former eruptions: Jaggar, 04; Mercalli, 02

gas of fumaroles: Gautier, 03; Moissan, 02

obelisk (spine): Argall, 03; Heilprin, 03c, 04, 05a, 06; Hovey, 03c, f; Jaggar, 04a; Russell, 03c, 04a

present condition: Hovey, 06g, 08b, 09h; Lacroix, 08

secondary volcanic phenomena: Curtis, 03

Momotombo, Nicaragua: Sapper, 05b

Mount Baker, Wash.: Davidson (G), 85

Mount Hood, Oreg.: Jillson, 17b; Sylvester, 08

Mount St. Helens, Wash.: Jillson, 17a, b

Mount Shasta: Diller, 95a

Nevado de Toluca, Mexico: Dollfus, 67c; Hobson, 07; Hovey, 07f; Waitz, 10d

Nicaragua: Chamberlin (P W), 03; Crawford (J), 02a; Dutton, 91a; Jones (J O), 03

North America: Russell, 97a

Oahu, Hawaii: Dana (J D), 89a

Oregon: Hague, 83

Orizaba, Mexico: Saussure, 58a; Waitz, 10c

Pacific region: Emmons (S F), 79

Pacific States: Zittel, 90

Poas Volcano, Costa Rica, eruptions: Tristán, 16a

Popocatepetl, Mexico: Aguilera, 95; Dollfus, 67a; Howarth, 96; Gerolt, 64a; Hovey, 07f, 08e; Keyes, 07e; Packard (A S), 86d; fumaroles: Aguilera, 97

Popocatepetl and Ixtaccihuatl, Mexico: Farington, 97



## Volcanoes—Continued.

- Quezaltepeque, San Salvador, eruption: Lacroix, 17  
 Real del Monte, Mexico, eruption: Burkart, 57a  
 Reventado Costa Rica: Tristán, 12e  
 St. Lucia, Soufrière: Hovey, 06h  
 St. Vincent, Soufrière: Anderson (J), 85;  
 Anderson (T), 02, 03, 03a, 07, 08b; Bergeat, 02; Curtis, 03a; Davis (H), 49;  
 Deckert, 03; Geinitz, 02; Hovey, 02e, f, g, 03e, 04j, 05g; Jaggar, 02a, b; Lacroix, 03, 03c, d, j; Russell, 02c; Sapper, 03k, l; Sharp, 90; Stübel, 03  
 eruption 1812: Huggins, 02  
 secondary volcanic phenomena: Curtis, 03  
 Salvador: Burkart, 69b; Dollfus, 68; Goodyear, 80a; Sapper, 00; Wuensch, 17  
 San Andrés, Mexico, postparoxysmal phenomena: Waitz, 06  
 San Salvador, eruption, June 1917: Friedlander, 18a, b; Powers, 18a  
 Santa Catarina, Mexico: Ordóñez, 95  
 Santa María, Guatemala: Ordóñez, 02c; Sapper, 03, 04; Winterton, 03  
 Santa María, Mexico: Böse, 04; Ordóñez, 04b  
 Tacaná, Chiapas, Mexico: Böse, 02a, 03  
 Trinidad, gas volcano: Anderson (R), 11b  
 Tuxtla, Mexico, eruption: Burkart, 35; Mozino, 74  
 Volcanoes in 1910: Reid (J A), 11  
 Washington: Hague, 83  
 West Indies, eruptions, 1902: Anderson (T), 03b; Burns, 04; Hass, 04; Hoernes, 03; Hovey, 05f, g; Kolderup, 02; Lobley, 03; Milne, 02 02a; Sapper, 03j, 05; Spencer (J W), 03a  
 Windward Islands: Hill (R T), 02c  
 Xinantecatl, Mexico: Flores, 06; Ordóñez, 02  
 Zacapu, Michoacán, Mex.: Ordóñez, 02b
- Volcanoes, extinct.
- Absaroka Range, Wyo.: Hague, 99c, 01  
 Alaska, St. Elias Mountains: Capps, 15  
 Arizona, Carrizo Mountain: Emery, 16  
 Fort Apache region: Reagan, 03b  
 San Franciscan field: Robinson (H H), 13  
 British Columbia, Coast Range: Burwash, 14a;  
 Garibaldi volcanic area: Burwash, 14c  
 California: Hague, 83  
 Lake Mono region: Le Conte, 79, 79a  
 Lassen Peak region: Diller, 87b  
 northern: Diller, 91  
 southern: Russell, 85c  
 Colorado: Endlich, 78b; Lakes, 90; Peale, 77a;  
 Van Diest, 89  
 Cripple Creek district: Cross, 95; Rickard, 01  
 Rosita Hills, Custer Co.: Cross, 91b  
 Spanish Peaks region: Hills, 89, 90b  
 Connecticut: Davis (W M), 91b  
 Cordillera: Emmons (S F), 79  
 Idaho, Snake River plains: Russell, 02a; southwestern: Russell, 03  
 Mexico, Michoacán, San Andrés: Saussure, 58;  
 Toluca: Burkart, 27  
 Mount Pitt, Oreg.: Emmons (A B), 86  
 Mount Rainier: Willis, 88b  
 Nevada, central: McGee, 95b

## Volcanoes, extinct—Continued.

- New Mexico: Blake (W P), 56a; Dutton, 84d, 85a; Hill (R T), 97b; Marcou, 97b  
 northeastern: Lee (W T), 12c  
 northern: Stevenson, 81b  
 northwestern: Dutton, 85  
 Raton Mesa region: Mertie, 13a  
 Oregon: Hague, 83; southeastern: Russell, 03  
 Panama, Chiriqui: MacDonald (D F), 13b  
 Plateau region: Reagan, 03a  
 Quebec, Mount Royal: Buchan, 01, 02, 14  
 St. Helens, eruptions: Diller, 99c  
 Texas, Pilot Knob: Hill (R T), 90f  
 United States: Tarr, 93c  
 Volcanic bombs, Nova Scotia: Poole, 08  
 Washington: Hague, 83; Cascades: Geballe, 17  
 Western United States: Gilbert, 75d  
 Wyoming, Crandall Basin: Iddings, 94b, 99d  
 Yellowstone National Park, Crandall Basin: Iddings, 93  
 Wabash arch, Ind.: Gorby, 86; Thompson (M), 89a  
 Wachsmuth, Charles, biography: Bather, 96a; Calvin, 97d; Keyes, 96d, n, 97d  
 Wagon Wheel Gap, Colo.: Emmons (W H), 13e  
 Wakarusa Creek, Kans.: Todd, 11a  
 Walcott, C. D., biography: Anon, 98  
 Waldron fauna, Ind.: Kindle, 09d  
 Wallala beds, Cal.: Fairbanks, 93d  
 Walnut Lake, Mich.: Davis (C A), 08a  
 Walsenburg folio, Colo.: (no. 68): Hills, 00  
 Wapanucka limestone, Okla.: Wallis, 15  
 War minerals: Leith, 18a; Spurr, 18  
 War work, geological: Meinzer, 18a; Smith (P S), 18a  
 Ward, H. A., biography: Farrington, 06d  
 Ward, L. F., biography: Hollick, 13  
 Wardner district, genesis of lead-silver ores: Ransome, 12  
 Warping, Alaska: Goodrich, 98; Great Lakes region: Spencer (J W), 94d  
 Warren folio, Pa.-N. Y. (no. 172): Butts, 10  
 Warrior coal basin, Ala.: Butts, 06b  
 Warsaw formation, Iowa: Gordon (C H), 95c  
 Wartburg folio, Tenn. (no. 40): Keith, 97  
 Wasatch deposits, origin: Loomis, 07a  
 Wasatch group: Hayden, 78f  
 Wasatch Mountains: Blackwelder, 10a; Loughlin, 13; glaciation: Atwood, 09  
 Washakie formation, Wyo.: Granger, 09; Sinclair, 09  
 Washburn lignite field, N. Dak.: Smith (C D), 09  
 Washington.  
 Bibliography: Arnold, 02; O'Donnell, 13  
 Cascade Mountains and Columbia River region: Rath, 84g  
 Cascade region: Evans (H F), 06a; Geballe, 17  
 Central Wash.: Gibbs, 55a  
 General: Becker, 85  
 Geological Survey, report: Landes, 02; Wash G S, 03, 10  
 Geology and vein systems: Ingalls, 09  
 Mount Tacoma: Rath, 84g  
 Northern Pacific Railroad, country bordering: Newberry, 85d  
 Okanogan Mountains: Evans (H F), 08  
 Osoyoos district: Evans (H F), 10



## Washington—Continued.

Soils, derivation: Calkins, 03

Stevens Co.: Shedd, 03a

Western Wash.: Gibbs, 55

*Economic geology.*

Blewett mining district: Weaver, 11

Building and ornamental stones: Shedd, 03

Building materials: Darton, 09b

Cement materials: Eckel, 13; Darton, 09b;  
Landes, 06; Shedd, 13

Clay: Geijsbeek, 11; Landes, 05; Shedd, 10

Coal: Dewsnap, 91; Goodyear, 77; Landes, 02d,  
03; Ritter, 06b; Smith (E E), 11; Smith  
(G O), 02, 06b; Tarr (R P), 07; Willis, 86d;  
Woodhouse, 96

Cascade Mountains: Russell, 00

Clallam Co.: Arnold, 05b

Cowlitz River valley: Collier, 13

Glacier field, Whatcom Co.: Woodruff, 14a

Issaquah field: Evans (G W), 14

King Co.: Evans (G W), 12

Kittitas Co.: Saunders, 14

Olympic fields: Reagan, 09, 16

Pierce Co.: Daniels, 14, 15

Puget Sound: Willis, 98

Roslyn field: Daniels, 12

Tacoma quadrangle: Willis, 99

western Wash.: Corey, 93

Colville Indian Reservation: Pardee, 18a

Conconully and Ruby districts: Jones (E L), 16

Copper: McIntyre, 07; Weed, 06

Cascade Mountains: Stretch, 04a

Index district: Weaver, 12

Myers Creek district: Umpleby, 11

Okanogan Co.: Handy, 16

Oroville-Nighthawk district: Umpleby, 11a

Osoyoos district: Evans (H F), 08b, 10

Covada district: Weaver, 13

Deu Pree lode, Cascade Mountains: Landes, 98

Electric-Point mine: Lakes, 16

Ellensburg quadrangle: Smith (G O), 03

Epsomite lake: Jenkins, 18b

General: Bethune, 91, 92; Fischer, 18; Landes,  
02b, c; Ruffner, 89

Geology and vein systems: Ingalls, 09

Gold: Collier, 07; Lincoln, 11b

Blewett district: Weaver, 11

Cascade Mountains: Russell, 00

central Wash.: Smith (G O), 03b

Mount Stuart quadrangle: Smith (G O), 04

Myers Creek mining district: Umpleby, 11

Okanogan Co.: Handy, 16

Olympic Peninsula: Reagan, 09

Oroville-Nighthawk district: Umpleby, 11a

Republic district: Umpleby, 10, 11b

Republic mine: Chatard, 00

river sands: Collier, 07

Snake River gravel bars: Washburn, 00

Gold placers, coast: Arnold, 05a

Gravel, Puget Sound: Borhek, 15

Index district: Landes, 00; Weaver, 12

Iron ores: Leith, 06; Shedd, 02; Whittier, 17

Clealum: Smith (G O), 01a

Snoqualmie quadrangle: Smith (G O), 06b

Kittitas Co.: Saunders, 14

Lava flood: Le Conte, 73a

Lead, Metaline district: Bancroft (H), 11a

## Washington—Continued.

*Economic geology—Continued.*

Lignite, Cowlitz River: Blake (W P), 67i

Limestone: Darton, 09b

Magnesite: Stone (R W), 18, 18a

northern Wash.: Jenkins, 18

Valley: Jenkins, 18a

Marble: Rathbun, 06

Metalliferous resources: Landes, 02b

Mineral deposits, northern Okanogan Co.:  
Handy, 16Mineral resources: Landes, 14; Ruffner, 92;  
Weaver, 16e

Miocene, lower: Weaver, 14

Monte Cristo district, Snohomish Co.: Fenner,  
92; Spurr, 00f

Mount Rainier: Smith (G O), 00d

Mount Stuart quadrangle: Smith (G O), 04

Myers Creek mining district: Umpleby, 11

Northeastern Wash.: Bancroft (H), 14

Northwestern Wash.: Reagan, 07

Okanogan Co.: Handy, 16

Oligocene: Clark (B L), 18a; Van Winkle, 18

Cowlitz River: Dickerson, 17a

Kitsap Co.: Weaver, 16d

paleogeography: Weaver, 18

Olympic Peninsula: Arnold, 06a; Reagan, 09,  
11a, 15, 16a; Weaver, 07; western part:  
Lupton, 14aOroville-Nighthawk mining district: Umpleby,  
11a

Pierce Co.: Daniels, 14

Porter Creek beds: Van Winkle, 18

Post-Eocene formations, western Wash.:  
Weaver, 16c

Puget group: White (C A), 88c; Willis, 97

Puget Sound region: Willis, 98

Quincy Valley: Schwennesen, 18a

Republic mining district: Umpleby, 10

Satsop formation: Bretz, 17

Sawtooth Range of Olympic Mountains: Ar-  
nold, 09Silverton district, Snohomish Co.: Stretch, 01,  
02

Skykomish basin: Smith (W D), 15

Structural materials: Darton, 09b

Tacoma quadrangle: Willis, 95

Tin, Spokane: Collier, 08; Whitman, 07

Tungsten: Joseph, 06; Wolf, 10

Deer Park: Bancroft (H C), 10b

Okanogan Co.: Handy, 16

Zinc, Metaline district: Bancroft (H), 11a

*Historical geology.*

Big Bend region: Meinzer, 18b

Blewett district: Weaver, 11

Camasland: Smith (G O), 00a

Cascade Mountains: Russell, 99a, 00; Smith  
(G O), 04b, c; Willis, 96; Tertiary granite:  
Smith (G O), 00b

Central Wash.: Russell, 93a; Smith (G O), 03a

Chehalis sandstone: Lawson, 94b

Coal deposits: Landes, 03

Columbia Plain: Symons, 82

Columbia River gorge: Chaney, 18

Colville Indian Reservation: Pardee, 18a

Conconully and Ruby districts: Jones (E L), 16

Cordillera, forty-ninth parallel: Daly (R A), 13



## Washington—Continued.

*Historical geology*—Continued.

- Correlation of international strata: Evans (H F), 08a  
 Covada district: Weaver, 13  
 Cowlitz River valley, Eocene: Weaver, 16b  
 East central Wash.: Calkins, 05  
 Ellensburg quadrangle: Smith (G O), 03  
 Eocene, Cowlitz Valley: Weaver, 15c  
 Franciscan sandstone: Davis (E F), 18  
 General: Gibbs, 73a; Landes, 02a, b; Ruffner, 89; Weaver, 15  
 Glacier coal field, Whatcom Co.: Woodruff, 14a  
 Index mining district: Weaver, 12  
 King Co.: Evans (G W), 12  
 Molybdenite, Crown Point: Crook, 04  
 Monte Cristo district: Spurr, 00f, 01; Stretch, 93  
 Mount Baker district, Whatcom Co.: Landes, 07; Smith (G O), 02b  
 Mount Stuart quadrangle: Smith (G O), 04  
 Myers Creek mining district: Umpleby, 11  
 Natural gas, Olympic Peninsula: Lupton, 14a  
 Nickel, San Poil district: Bancroft (H), 12  
 Nonmetalliferous resources: Landes, 02c  
 Northeastern Wash.: Bancroft (H), 14  
 Oil and gas possibilities: Weaver, 15  
 Okanogan Co., northern: Handy, 16  
 Olympic Peninsula, mineral resources: Reagan, 11d; western part: Lupton, 14a  
 Ores, coals, and useful rocks: Roberts (M), 17  
 Oroville-Nighthawk mining district: Umpleby, 11a  
 Osoyoos district: Evans (H F), 10  
 Petroleum, Olympic Peninsula: Lupton, 14a; western Wash.: Weaver, 16  
 Republic district, Stevens Co.: Joseph, 98; Lindgren, 14a; Umpleby, 10, 11b  
 Road materials: Landes, 11  
 St. Helens mining district: Winchell (H V), 12a; Zapffe, 12a  
 Sand, Puget Sound: Borhek, 15  
 Selenium-bearing ores, Republic district: Lindgren, 09d  
 Serpentine marbles: Lyon, 01  
 Silver, Covada district: Weaver, 13  
 Oroville-Nighthawk district: Umpleby, 11a  
 Republic district: Umpleby, 10, 11b  
 Seattle region: Weaver, 15a  
 Skykomish basin: Smith (W D), 15; Smith (W S), 16  
 Snoqualmie quadrangle: Smith (G O), 06b  
 South central Wash.: Waring (G A), 13  
 Southeastern Wash.: Russell, 97b, d  
 Tacoma quadrangle: Willis, 99  
 Tejon group: Dickerson, 15  
 Tertiary: Arnold, 09b  
 marine: Arnold, 13  
 southwestern Wash.: Weaver, 12a  
 western Wash.: Weaver, 12a, 15d, 16, 16a  
 Western Wash., coal-bearing Eocene: Jones (W F), 14  
 White Bluffs region: Merriam, 17  
 Yakima Co.: Smith (G O), 01
- Mineralogy.*  
 Diaphorite, Okanogan Co.: Spencer (L J), 98  
 Ferritungstite: Schaller, 11c, 12  
 Minerals: Mead (H D), 06

## Washington—Continued.

*Mineralogy*—Continued.

- Opal in basalt: Kunz, 91a  
 Realgar, Snohomish Co.: Moses, 01

*Paleontology.*

- Branchioplax, Port Townsend: Rathbun, 16  
 Carboniferous: Meek, 76b  
 Clallam formation: Reagan, 10  
 Cowlitz River valley, Eocene: Weaver, 16b  
 Eagle Creek flora, Columbia River gorge: Chaney, 18  
 Elephas, southwestern Wash.: Donald, 79; Whitman Co.: Sternberg, 03  
 Elephas primigenius, Spokane: Higley, 86  
 Invertebrata: White (C A), 89a  
 Moss, Seattle: Hollick, 98e  
 Oligocene: Van Winkle, 18; Cowlitz River: Dickerson, 17a  
 Olympic Peninsula: Reagan, 09  
 Plantae: Knowlton, 02a; Newberry, 63  
 Bellingham Bay: Heer, 59; Lesquereux, 59  
 Ellensburg: Knowlton, 93b  
 Porter Creek beds: Van Winkle, 18  
 Post-Eocene formations, western Wash.: Weaver, 16c  
 Quaternary: Sternberg, 81b  
 Rhynchostegium, Kittitas Co.: Britton (E G), 99  
 Salvinia: Hollick, 94a  
 Skykomish basin: Smith (W S), 16  
 Tejon fauna: Dickerson, 15  
 Tertiary: Shumard (B F), 58a  
 freshwater Mollusca: Hannibal, 12  
 western Wash.: Weaver, 12a, 16a  
 Tortoise, Kittitas Co.: Hay (O P), 99

*Petrology.*

- Blewett district: Weaver, 11  
 Cascade Range: Smith (G O), 04b  
 Cascades, Tertiary granite: Smith (G O), 00b  
 Cordillera, forty-ninth parallel: Daly (R A), 13  
 Minette, apatitic: Ransome, 08e  
 Mount Rainier: Smith (G O), 98  
 Okanogan composite batholith: Daly (R A), 06a  
 Pseudoserpentine, Stevens Co.: Clarke (F W), 03b  
 Rock specimens: Roberts, 06  
 St. Helens mining district: Zapffe, 12a  
 Sawtooth Range of Olympic Mountains: Arnold, 09  
 Skykomish basin: Smith (W D), 15  
 Snoqualmie quadrangle: Smith (G O), 06b  
 Tacoma: Oebbecke, 85

*Physical geology.*

- Basalt mounds of Columbia lava: Piper, 05  
 Cascade Mountains: Russell, 00; Smith (G O), 04c; structure and age: Le Conte, 73a  
 Chelan Glacier: Gannett, 05  
 Drift mounds, Olympia: Rogers (G O), 93  
 Glaciers: Rabot, 09  
 Mount Adams: Lyman, 9f; Reid (H F), 05c, 06  
 Mount Baker: Landes, 07  
 Mount Rainier: Matthes, 12a, 13, 13a, 14b; Russell, 98a  
 Ice caves, Mount Adams: Condon, 96a



## Washington—Continued.

*Physical geology*—Continued.

Landslides, Mount Stuart quadrangle: Smith (G O), 00c

Mount Baker, eruptions: Davidson (G), 85

Mount St. Helens, eruptions: Diller, 99c; Jillson, 17a, b

Nisqually Glacier, motion of: Le Conte (J N), 06

Wenatchee-Chelan district, Cascade Range, deformation: Willis, 03

*Physiographic geology*.

Abandoned stream gaps, northern Wash.: Smith (G O), 03d

Anticlinal mountain ridges, central Wash.: Smith (G O), 03c

Big Bend region: Meinzer, 18b

Camasland: Smith (G O), 00a

Camp Lewis and vicinity: Leighton (M M), 18

Cascade Mountains: Russell, 00; Willis, 96; post-Tertiary deformation: Willis, 03b

Central Wash.: Russell, 93a; Smith (G O), 03a

Columbia Plain: Symons, 82

Columbia River gorge: Chaney, 18

Colville Indian Reservation: Pardee, 18a

Conconully and Ruby districts: Jones (E L), 16

Contraposed shore lines, Juan de Fuca strait: Keyes, 15q

Cordilleran ice sheet: Stewart (C A), 13b

Drainage changes: Willis, 87

Drift deposits, mouth of Columbia River: Smith (W H), 93

Drift deposits, Seattle, Tacoma, and Olympia: Upham, 04e

Drift phenomena, Puget Sound: Willis, 98a, b

Eastern Wash.: Hershey, 12

Ellensburg quadrangle: Smith (G O), 03

Epsomite lake: Jenkins, 18b

Fjords of Puget Sound: Upham, 08

General: Gibbs, 73a; Landes, 02a; Morse, 85; Saunders, 16; Weaver, 15

Glacial lakes of Puget Sound: Bretz, 10

Glaciation: Wright (G F), 87a

Okanogan Co.: Dawson (W L), 98

Puget Sound region: Bretz, 13; Willis, 97a

Grande Coulee: Oestreich, 15

High level terraces, Okanogan Valley: Keyes 17h

Lake Chelan region: Fairbanks, 02; Gannett, 98a, 05; Russell, 98b; Willis, 00c, 03b

Moraine, diagonal: Plummer, 93

Mount Adams: Reid (H F), 02

Mount Rainier: Landes, 05b; Matthes, 14; Smith (G O), 00d; Williams (J H), 10; Willis, 84

Mount Rainier National Park: Matthes, 16a; Roberts, 09

Mount Stuart quadrangle: Smith (G O), 04

Myers Creek mining district: Umpleby, 11

Oroville-Nighthawk mining district: Umpleby, 11a

Pleistocene, western Wash.: Bretz, 15

Puget Sound, exhumed seacoasts: Keyes, 15g; Pleistocene history: Willis, 97b

Puget Sound basin: Kimball, 97

Puget Sound glacier, terminal moraine: Bretz, 11

Puget Sound region: Bretz, 13

## Washington—Continued.

*Physiographic geology*—Continued.

Skykomish Basin: Smith (W D), 17

Terrace, Columbia: Russell, 98b

Tide marshes: Morse, 85

Volcanoes: Hague, 83

Wenatchee-Chelan district, Cascade Range: Willis, 03

Western Wash.: Leighton (M M), 18; Weaver, 15b

*Underground water*.

East central Wash.: Calkins, 05

General: Byers, 02; Landes, 05a, 16; Van Winkle, 14

Quincy Valley: Schwennesen, 18a

Southeastern Wash.: Russell, 97b

South central Wash.: Waring (G A), 13

Water resources: Byers, 02

Yakima Co.: Smith (G O), 01

Washington folio, D. C.—Va.—Md. (no. 70): Darton, 01

Washington limestone, Vt.: Richardson (C H), 98

Washoe rocks, Nev.: Becker, 87

Watchung basalt: Fenner, 10b

Watchung trap: Fenner, 08, 08a

Watchung Mountain, N. J.: Lewis (J V), 07

Water, analysis: Dole, 11; constitution: Smyth, 13; function: McGee, 08

Water, underground. *See* Underground water.

Water biscuit, Canandaigua Lake: Clarke (J M), 00d

Water supply of public lands: Heroy, 13

Water surfaces in oil fields: Daly (M B), 18

Waterfalls. *See* Falls.

Water-planes, ancient, and crustal deformation: Robinson (H H), 08

Water-planes in Lake Michigan basin: Goldthwait, 08

Watkins Glen, N. Y.: Tarr (R S), 06b, g

Watkins Glen-Catatonk folio, N. Y. (no. 169): Williams (H S), 09a

Watkins quadrangle, N. Y.: Clarke (J M), 05 b

Wave lines: Hall, 43d, e

Wave marks, Cincinnati region: Foerste, 95

Waverly formation, Kentucky: Morse (W C), 09, 12

Waverly group: Herrick, 89; central Ohio: Hicks, 78a

Waverlyan period of Tennessee: Bassler, 11d

Waves: Cornish, 10; effect on shoreline: Davis (W M), 02f

Wayland quadrangle, N. Y.: Luther, 11

Waynesboro quadrangle, Tenn.: Drake, 14

Waynesburg folio, Pa. (no. 121): Stone (R W), 05

Weathering.

Algal erosion: Andrée, 14

Alkali carbonate solution, action: Hilgard, 96

Allanite: Watson (T L), 17

Alnoite, Manheim, N. Y.: Smyth (C H), 98

Arctic latitudes: Tarr, 97

Arid regions: Keyes, 10g

Arkose deposits: Barton, 16

Bacterial agency: Branner, 97a

Basalts, northwestern, soil formation from: Hilgard, 87



## Weathering—Continued.

- Boulders of decomposition: Spencer (J W), 85a, 87c  
 Coal in Green River Basin, Wyo.: Schultz, 10a  
 Concentric weathering in sedimentary rocks: Hopkins (T C), 98b  
 Crystalline rocks, decomposition: Hunt, 74f  
 Decay of rocks: Hunt, 83c; Russell, 89a  
 Decomposition of rocks: Rogers (W B), 49  
 Desert weathering: Hobbs, 18a  
 Diabase, Chatham, Va.: Watson, 99a; Medford, Mass.: Merrill (G P), 96b  
 Disintegration of granitic rocks: Merrill (G P), 95c  
 Disintegration of rocks and consequences: Hunt, 75f  
 Disintegration of stone: Barnum, 02  
 Dolomite, decomposition: Knight (N), 08  
 Exfoliation of rocks near Gettysburg, Pa.: Frazer, 75g  
 Formation of residual clay: Buckman (H O), 11  
 Geest: McGee, 02b  
 General: Barrell, 02; Ehrenfeld, 16; Hanks, 93; Hitchcock (E), 35; Hunt, 83c; Leith, 15; Merrill (G P), 96a, 97, 99; Pumpelly, 79; Steidtmann, 11; Stockbridge, 88; Watson (T L), 02  
 Georgia, granitic rocks: Watson (T L), 01  
 Gneiss, Virginia: Merrill (G P), 97b  
 Granitic masses, disintegration: Keyes, 95p  
 Hornblende gabbro, zonal weathering: Brockaw, 16a  
 Humus acids, geologic action: Julien, 80a  
 Indiana, north and south slopes: Culbertson, 00  
 Iowa, granitic masses: Keyes, 93l  
 Jurassic strata: Dacqué, 11  
 Kaolins, white residual, origin: Ries, 11b  
 Local decomposition of rock by preglacial peat bogs: Humphreys, 11  
 Marbles and limestones: Merrill (G P), 15a  
 Massachusetts, Hoosac Mountain: Hunt, 75c  
 Massive rocks, sculpture: Gilbert, 05b  
 Mississippi Bottom, origin: Hilgard, 71b  
 Panama: Hayes, 11c  
 Pennsylvania, Gettysburg: Frazer, 75b  
 Pottsville conglomerate: Winslow, 84  
 Preglacial decay of rocks: Chalmers, 98b  
 Preservation of glaciated rocks: Fuller (H T), 91  
 Quartzite, decay: Dana (J D), 84e, 85a  
 Red color, origin: Dana (J D), 90c; Russell, 89a  
 Rock decay: Merrill (G P), 96a; Pumpelly, 91; Nicaragua: Hayes, 99  
 Rock folds: Campbell (M R), 06c  
 Rock-weathering and soil formation: Hilgard, 06, 06a  
 Rocks, alteration: Steidtmann, 08; decomposition: Clarke (F W), 08  
 Sandstone: Wadsworth, 83c  
 Serpentine: Helmhacker, 96  
 Soil wastage: Chamberlin (T C), 09c  
 Soils, formation: Thompson (M), 89c; from basalt: Hilgard, 87  
 Soils, source of constituents: Hall (C W), 01c  
 Spheroidal weathering of dikes: Kemp, 09a; Villars, 09

## Weathering—Continued.

- Stability of minerals: Fry, 15a  
 Subaqueous differential weathering: Fuller, 00  
 Subcarboniferous limestone in southern Indiana: Cumings, 06b  
 Superficial discoloration of rocks: Blake (W P), 05a  
 Volcanic tuffs: Pirsson, 15a  
 Weathering and erosion as time measures: Leverett, 09  
 Weber River coal field, Utah: Taff, 06a  
 Webster, N. C., nickel: Barlow, 06b  
 Well records. *See* Borings.  
 Wells, deep: White (I C), 14; in southern Maine: Bayley, 09a  
 Wenatchee-Chelan district, Cascade Range: Willis, 03  
 Western reserve coal field, Ohio: Whittlesey, 53  
 Western States.  
   General: Ball, 35; Hayden, 70; Marcou, 58  
   Lavas of plateau region, age: Reagan, 03a  
   Union Pacific Railroad, geology: Kneeland, 74  
   Upper Missouri: Culbertson, 51  
 West Indian bridge, North to South America: Spencer (J W), 98f  
 West Indies (general). *See also names of islands.*  
   Antilles: Montserrat, 67; Moreau de Jonnés, 22  
   Archean nuclei of Antilles: Frazer, 98  
   Barrier reefs, platforms: Vaughan, 14e  
   Bermuda Islands: Bullen, 11  
   Caribbean region, geological connections: Guppy, 09  
   Cenozoic history: Vaughan, 18c  
   Danish West Indies: Böggild, 07  
   Elevation and subsidence: Spencer (J W), 04  
   General: Guppy, 11; Hill (R T), 98d; Maclure, 32a; Martin (K), 88; Molengraaff, 88; Prudhomme, 82; Wall, 12  
   Mesozoic history: Stanton, 18  
   Sombrero: Julien, 66  
   Tertiary coral reefs, Antilles: Vaughan, 02h  
*Economic geology.*  
   Iron-ore reserves: Kemp, 10b  
   Mineral resources: Day (D T), 99  
   Phosphate: Hughes (G), 85; Redonda: Shepard, 69c  
*Historical geology.*  
   Archean, Antilles: Frazer, 90a  
   Cretaceous and Tertiary: Vaughan, 15d  
   General: Dickerson, 17c; Maclure, 17a; Sainte-Clair Deville, 40; Vaughan, 15a  
   Miocene: Duncan, 64  
   Northeastern Islands: Cleve, 71, 81, 82  
   Oligocene: Dall, 16b  
   Tertiary: Guppy, 66c, 67b  
     correlation: Vaughan, 18d  
     older: Duncan, 73  
   Volcanic formations, age: Spencer (J W), 03b  
   Windward Islands: Hill (R T), 02c  
*Mineralogy.*  
   Key of Sombrero minerals: Julien, 65  
   Monetite, Moneta: Shepard, 82  
   Monite, Mona: Shepard, 82  
   Pyroclastic: Shepard, 82  
   Pyrophosphorite: Shepard, 78



## West Indies—Continued.

*Paleontology.*

- Anthozoa: Duncan, 63  
 Echinodermata: Guppy, 79b  
 Mammalia, affinities and origin: Matthew (W D), 18b  
 Mollusca: Guppy, 79; terrestrial: Bland, 71  
 Orbitoides: Jones (T R), 64  
 Tertiary: Gabb, 75a; Guppy, 66c, 67, 67b, 74, 75, 96  
 Echinoidea: Guppy, 66b  
 older: Duncan, 73

*Petrology.*

- Caribbean Islands: Frazer, 03a  
 General: Rammelsberg, 53  
 Lesser Antilles: Högbom, 05  
 Primary rocks: Frazer, 90a  
 Volcanic dust: Bonney, 03c; Falconer, 02a; Porter (T C), 02; Teall, 02

*Physical geology.*

- Changes of level: Simpson (C T), 94  
 Earthquakes: Poey, 74; Montessus, 02; catalog: Poey, 58  
 Seismological relations: Montessus de Ballore, 04  
 Volcanoes: Sapper, 05; eruption phenomena: Burns, 04  
 eruptions, Lesser Antilles: Hoernes, 03; Montessus de Ballore, 02; Sapper, 04a; Supan, 02  
 Windward Islands: Hill (R T), 02c; Russell, 02b  
 1902: Anderson (T), 03b; Haas, 04; Lobley, 03; Milne, 02, 02a; Sapper, 04a  
 relationship: Spencer (J W), 03a

*Physiographic geology.*

- Coral-reef areas: Vaughan, 14c  
 Evolution of Antilles: Falconer, 02  
 General: Jukes-Browne, 91; Spencer (J W), 98f  
 Lesser Antilles: Hill (R T), 03c  
 Littoral features: Vaughan, 16c  
 Physiographic notes: Wegener, 04  
 Windward Islands: Hill (R T), 05c

West Kootenay, B. C.: Drysdale, 12

West Shiningtree gold district, Ont.: Stewart (R B), 12, 13a

## West Virginia.

- Bibliography: Brown (S B), 61  
 Boring, Wheeling: Hallock, 91, 94  
 Doddridge and Harrison cos.: Hennen, 12  
 General: Emmons (S F), 93  
 Harpers Ferry region: Mitchell, 14d  
 Jackson, Mason, and Putnam area: Krebs, 11  
 Kenova quadrangle: Phalen, 12  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Monongalia Co.: White (I C), 83e  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Soils, Boone Co.: Latimer, 15  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Raleigh Co.: Latimer, 16  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Survey reports: White (I C), 98, 99, 02
- Economic geology.*  
 Anthracite, Third Hill Mountain, Berkeley and Morgan cos.: Griffith, 02

## West Virginia—Continued.

*Economic geology—Continued.*

- Appalachian geosyncline, deep sand oil and gas possibilities: Reger, 16  
 Asphalt: Fontaine, 73  
 Barbour Co.: Reger, 18  
 Bitumen, Wood Co.: Lesley, 63a  
 Boone Co.: Krebs, 15  
 Braxton and Clay cos.: Hennen, 17  
 Buckhannon quadrangle: Taff, 96  
 Building materials: Grimsley, 09  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Pan Handle cos.: Grimsley, 07  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Burning Springs-Volcano anticline: Clapp (F G), 10c  
 Cabell, Wayne, and Lincoln cos.: Krebs, 13  
 Cement materials: Eckel, 13; Grimsley, 06, 07a  
 Charleston quadrangle: Campbell (M R), 01  
 Chesapeake and Ohio Railroad route: Ridgway, 72  
 Clay: Grimsley, 06  
 Doddridge and Harrison cos.: Hennen, 12  
 Jackson, Mason, and Putnam cos.: Krebs, 11  
 Kenova quadrangle: Phalen, 08a  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Pan Handle cos.: Grimsley, 07  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Coal: Alderson, 07; Burrows (J S), 15a; Campbell (M R), 96; Edwards (W S), 92; Hennen, 16; Hildreth, 35; Hotchkiss, 80a; Poole, 04a; Parsons (F W), 07; Ramsay, 96; Rogers (W B), 40, 41, 43b; Roy, 83; Simmersbach, 03; Stevenson, 75b; Stoek, 09; White (D), 09a; White (I C), 82a, 83c, 03, 08  
 Accident quadrangle: Martin (G C), 08a  
 analyses: White (I C), 10  
 Appalachian field: White (I C), 03  
 Barbour Co.: Cox (E T), 84; Reger, 18  
 bituminous: Heurteau, 03  
 Boone Co.: Krebs, 15; Richardson (J W), 59  
 Braxton and Clay cos.: Hennen, 17  
 Buckhannon quadrangle: Taff, 96  
 Cabell, Wayne, and Lincoln cos.: Krebs, 13  
 Cabin Creek, Great Kanawha Valley: Ansted, 85; White (I C), 85f  
 central W. Va.: Stoek, 09c  
 Charleston quadrangle, Campbell (M R), 01  
 Coal River: Rogers (W B), 85  
 Doddridge and Harrison cos.: Hennen, 12  
 Elk Garden field: Taff, 96a; Weeks, 95  
 Fairmont field: Parsons (F W), 06b  
 Fayette Co.: Hotchkiss, 80c  
 Flat Top field: Hitchcock (C H), 82a; Hotchkiss, 82b; Sanders, 83  
 Great Kanawha field: Buck, 81; Hotchkiss, 82c; Maury, 73; Orton, 82b; Robinson (N), 04; Shaler, 81b; Stevenson, 73a; White (I C), 85a  
 Guyandot field: Roy, 99  
 Holden: Lyman (R H), 06  
 Huntington quadrangle: Campbell (M R), 00  
 Jackson, Mason, and Putnam cos.: Krebs, 11



## West Virginia—Continued.

*Economic geology*—Continued.

- Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Kanawha Co.: Krebs, 14; Sheaffer, 84  
 Kenova quadrangle: Phalen, 06b, 08a, 12  
 Lewis and Gilmer cos.: Reger, 16  
 Little Sewell Mountain, Greenbrier Co.: Fontaine, 82  
 Logan Co.: Hennen, 14a  
 Loop Creek field: Langdon, 96  
 map of coal areas: W Va G S, 08  
 Marion, Monongalia, and Taylor cos.: Hennen, 13  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Meadow Branch field: Campbell (M R), 04a; Grimsley, 16  
 Mercer Co.: Krebs, 16  
 Mingo Co.: Hennen, 14a  
 Monongalia and Marion cos.: Stevenson, 73b  
 New River field: Fontaine, 76; Morris (S F), 80; Robinson, 04; Stevens (R P), 74 c; Young (C A), 79  
 Nicholas quadrangle: Ashley, 05  
 Ohio River cos.: White (I C), 81d, 83b  
 Pan Handle cos.: Grimsley, 07  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Peytona, Boone Co.: Lyman, 95a  
 Pittsburgh coal bed: Burroughs, 14c  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Pocahontas field: Althouse, 06, 07; Fowler, 04; Stow, 13  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Potomac fields: Stock, 09b  
 Potomac basin: Weeks, 94, 95  
 Preston Co.: Hennen, 14; Rogers (W B), 54 b; Sheaffer, 55; Stevenson, 81e  
 Quinimont group, Mercer Co.: Stevenson, 81f  
 Raleigh and Wyoming cos.: Althouse, 06  
 Raleigh Co.: Krebs, 16  
 Raleigh quadrangle: Campbell (M R), 02  
 Roaring Creek field: Weeks, 94  
 Rug River field, Mingo Co.: Payne (H M), 05  
 Sleepy Creek basin, Morgan Co.: White (D), 03b  
 southern W. Va.: Parsons (F), 07, 12  
 Steubenville quadrangle: Griswold, 07  
 Summers Co.: Krebs, 16  
 Tazwell quadrangle: Campbell (M R), 97  
 Twelve Pole region: Roy, 92  
 Upshur Co.: Reger, 18  
 Wheeling: White (I C), 83a  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Wyoming and McDowell cos.: Hennen, 15  
 Doddridge and Harrison cos.: Hennen, 12  
 Franklin quadrangle: Darton, 96c  
 General: Maury, 76; Rogers (W B), 36, 40, 41, 82b, 84; White (I C), 82a, 01  
 Geologic map: Morris, 99; White (I C), 04a  
 Glass sand: Stose, 06a  
 Grahamite: Eldridge, 01; Wurtz, 70b; Ritchie Co.: Fontaine, 73; White (I C), 99a

## West Virginia—Continued.

*Economic geology*—Continued.

- Great Kanawha Valley: White (I C), 85a  
 Huntington quadrangle: Campbell (M R), 00a  
 Iron ores: Grimsley, 09; Rogers (W B), 80a  
 Barbour Co.: Cox (E T), 84  
 Great Kanawha Valley: Shaler, 81b  
 Greenbrier Co.: Page, 89  
 Preston Co.: Rogers (W B), 54b; Sheaffer, 55  
 Jackson, Mason, and Putnam cos.: Krebs, 11  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Kanawha Co.: Krebs, 14  
 Kenova quadrangle: Phalen, 08a  
 Lewis and Gilmer cos.: Reger, 16  
 Limestone: Eckel, 13; Grimsley, 06, 08  
 Berkeley Co.: Stose, 04  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 map of limestone areas: W Va G S, 08  
 Logan Co.: Hennen, 14a  
 Map of coal, oil, gas, iron, and limestone areas: W Va G S, 08, 17  
 Marion, Monongalia, and Taylor cos.: Hennen, 13  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Mineral resources: DeBar, 70  
 Mingo Co.: Hennen, 14a  
 Monongalia Co.: Stevenson, 71; White (I C), 83e  
 Monterey quadrangle: Darton, 99  
 Natural gas: Hildreth, 33; White (I C), 91b, 99, 04, 11, 11a  
 Appalachian fields, present and future of: Clapp (F G), 10b  
 Braxton and Clay cos.: Hennen, 17  
 Cabell, Wayne, and Lincoln cos.: Krebs, 13  
 Doddridge and Harrison cos.: Hennen, 12  
 Jackson, Mason, and Putnam cos.: Krebs, 11  
 Kanawha Valley: Allen (T), 48; Lewis (J A), 45  
 Lewis and Gilmer cos.: Reger, 16  
 Logan Co.: Hennen, 14a  
 map of natural gas areas: W Va G S, 08  
 Marion, Monongalia, and Taylor cos.: Hennen, 13  
 Marshall, Wetzel, and Tyler cos.: Hennen, 09  
 Mingo Co.: Hennen, 14a  
 Morgantown: White (I C), 85c  
 Panhandle cos.: Grimsley, 07  
 Pleasants, Wood, and Ritchie cos.: Grimsley, 10  
 Preston Co.: Hennen, 14  
 Steubenville quadrangle: Griswold, 07a  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Wood, Ritchie, and Pleasants cos.: W Va G S, 10  
 Wyoming and McDowell cos.: Hennen, 15  
 Panhandle cos.: Grimsley, 07  
 Pawpaw and Hancock quadrangles: Stose, 12b  
 Petroleum: Andrews (E B), 61; Evans (E W), 66; Fuller, 17; Warner, 71; White (I C), 91b, 99, 11, 11a  
 black shales: Ashley, 17  
 Boone Co.: Krebs, 15  
 Braxton and Clay cos.: Hennen, 17



## West Virginia—Continued.

*Economic geology—Continued.*

Petroleum: Burning Springs-Volcano anticline:  
Clapp (F G), 10c

Cabell, Wayne, and Lincoln cos.: Krebs, 13  
Doddridge and Harrison cos.: Hennen, 12  
Jackson, Mason, and Putnam cos.: Krebs, 11  
Lewis and Gilmer cos.: Reger, 16

Logan Co.: Hennen, 14a

Mannington field: White (I C), 92

map of oil areas: W Va G S, 08

Marion, Monongalia, and Taylor cos.: Hennen, 13

Marshall, Wetzel, and Tyler cos.: Hennen, 09

Mingo Co.: Hennen, 14a

origin: White (I C), 04

Panhandle cos.: Grimsley, 07

Pleasants, Wood, and Ritchie cos.: Grimsley, 10

Preston Co.: Hennen, 14

Steubenville quadrangle: Griswold, 07

Wirt, Roane, and Calhoun cos.: Hennen, 11

Wood, Ritchie, and Pleasants cos.: W Va G S, 10

Wyoming and McDowell cos.: Hennen, 15

Piedmont quadrangle: Darton, 96b

Preston Co.: Hennen, 14

Raleigh Co.: Krebs, 16

Raleigh quadrangle: Campbell (M R), 02

Randolph Co., western part: Reger, 18

Salt: Grimsley, 09; Hildreth, 33

Jackson, Mason, and Putnam cos.: Krebs, 11

Kanawha valley: Allen (T), 48

Sandstone: Grimsley, 09

Shenandoah Valley: Hotchkiss, 80b

Slate: Dale, 06e; Grimsley, 09; Martinsburg: Dale, 03

Southern Va.: Parsons (F), 12

Summers Co.: western part: Krebs, 16

Tazewell quadrangle: Campbell (M R), 97

Upshur Co.: Reger, 18

Wirt, Roane, and Calhoun cos.: Hennen, 11

Wyoming and McDowell cos.: Hennen, 15

*Historical geology.*

Accident and Grantsville quadrangles: Martin (G C), 08a

Alleghany coal field: Andrews (E B), 75a; Whittlesey, 74a

Appalachian coal field: White (I C), 03

Barbour Co.: Reger, 18

Blue Ridge, structure, near Harper's Ferry: Geiger, 91

Boone Co.: Krebs, 15

Boring, Clarksburg, Harrison Co.: White (I C), 18c

Kanawha Co.: White (I C), 14a

Morgantown: White (I C), 85c

Braxton and Clay cos.: Hennen, 17; Price (W A), 17

Buckhannon quadrangle: Taff, 96

Cabell, Wayne, and Lincoln cos.: Krebs 13

Carboniferous: Fontaine, 77, 80; Stevenson, 87c, 04, 06; Monongalia and Marion cos.: Stevenson, 73b

Catoctin belt: Keith, 94a

Charleston quadrangle: Campbell (M R), 01

## West Virginia—Continued.

*Historical geology—Continued.*

Charleston sandstone: Campbell (M R), 03b

Cheat River region: White (I C), 82b

Coal Measure sections, Boone Co.: Lyman, 95a

Coal Measures: Ramsay, 96; Stevenson, 73; White (I C), 74a, 91

Kanawha Valley: Stevenson, 73a

Monongalia and Preston cos.: Brown (S B), 92

Coal River: Rogers (W B), 85

Conglomerate, New River: Fontaine, 74; Young (C A), 77

Conglomerate series: Fontaine, 76

Deep wells: White (I C), 18

Devonian, Romney region: Prosser, 15

Devonian and Mississippian: Williams (H S), 05

Doddridge and Harrison cos.: Hennen, 12

Flat Top coal field: Hotchkiss, 82b

Franklin quadrangle: Darton, 96c

General: Rogers (W B), 36, 40, 41, 82b, 84; Stevenson, 75b; White (I C), 82a, 83c, 99, 01, 04

Geologic map: Hotchkiss, 80e; Rogers (W B), 75b; White (I C), 04a

Great Kanawha coal field: White (I C), 84a

Great Kanawha Valley: White (I C), 85a

Greenbrier Co.: Meek, 80; Page, 89

Harpers Ferry quadrangle: Keith, 94

Hawk's Nest-Gauley Mountain section: Page, 80

Huntington quadrangle: Campbell (M R), 00a

Jackson, Mason, and Putnam cos.: Krebs, 11

Jefferson, Berkeley and Morgan cos.: Grimsley, 16

Kanawha Co.: Krebs, 14

Kanawha series: Hennen, 14b; White (D), 00a, 14

Kenova quadrangle: Phalen, 12

Lewis and Gilmer cos.: Reger, 16

Logan Co.: Hennen, 14a

Marion, Monongalia, and Taylor cos.: Hennen, 13

Marshall, Wetzel, and Tyler cos.: Hennen, 09

Mercer Co., western part: Krebs, 16

Mingo Co.: Hennen, 14a

Monongalia Co.: Stevenson, 71; White (I C), 83e

Monterey quadrangle: Darton, 99

Ohio River sections: White (I C), 83b

Onondaga formation: Kindle, 12

Panhandle cos.: Grimsley, 07

Pawpaw and Hancock quadrangles: Stose, 12b

Piedmont quadrangle: Darton, 96b

Pleasants, Wood, and Ritchie cos.: Grimsley, 10

Pocahontas quadrangle: Campbell (M R), 96a

Potomac River region: White (I C), 81c

Pottsville series, New River: White (D), 95

Preston Co.: Hennen, 14; Rogers (W B), 54b

Raleigh Co.: Krebs, 16

Raleigh quadrangle: Campbell (M R), 02

Randolph Co., western part: Reger, 18

Red beds: Beede, 12a

Ritchie and Tyler cos.: Frazer, 74a



## West Virginia—Continued.

*Historical geology*—Continued.

- Section along New and Kanawha rivers:  
 Campbell (M R), 96  
 Staunton quadrangle: Darton, 94e  
 Steubenville quadrangle: Griswold, 07a  
 Table of formations: Rogers (W B), 80  
 Tazewell quadrangle: Campbell (M R), 97  
 Uffington shale: Price (W A), 17a, b  
 Vespertine strata: Fontaine, 77  
 Wirt, Roane, and Calhoun cos.: Hennen, 11  
 Wyoming and McDowell cos.: Hennen, 15  
 Wheeling: White (I C), 83a

*Mineralogy.*

- Celestite, Mineral Co.: Williams (G H), 90b  
 Meteorite, Charleston: Bailey (S C H), 85  
 Jenny's Creek, Wayne Co.: Kunz, 86, 86h  
 White Sulphur Springs: Fletcher (L), 87

*Paleontology.*

- Ames limestone fossils: Beede, 12  
 Aneimites, seeds: White (D), 05  
 Boone Co.: Price (W A), 15a  
 Braxton and Clay cos.: Price (W A), 17  
 Carboniferous: Meek, 71h  
 Conemaugh and Pottsville faunas: Price (W A), 18  
 Conemaugh fauna: Beede, 13; White (I C), 02b  
 Devonian and Mississippian: Williams (H S), 05  
 Flora: White (D), 13a; White (I C), 82c  
 Kanawha Co.: Price (W A), 14  
 Lewis and Gilmer cos.: Price (W A), 16  
 Logan Co.: Price (W A), 15  
 Mingo Co.: Price (W A), 15  
 Oribos cavifrons: Hatcher, 02e  
 Pareiasaurus Conemaugh series: Case, 17a  
 Permian flora: Fontaine, 80  
 Plants: Millspaugh, 92  
 Polypore: Hollick, 10a  
 Preston Co.: Price (W A), 14a  
 Quaternary plants, Morgantown: Knowlton, 96c  
 Raleigh and adjacent cos.: Price (W A), 16a  
 Siluric Cystoidea: Schuchert, 03d

*Physical geology.*

- Chestnut Ridge disturbance: Gardner (J H), 15  
 Franklin quadrangle: Darton, 96c  
 Kanawha black flint: Price (W A), 18a  
 Piedmont quadrangle: Darton, 96b  
 Subterranean temperature, Wheeling: Hallock, 97

Temperature in deep wells: Van Orstrand, 18

*Physiographic geology.*

- Braxton and Clay cos.: Hennen, 17  
 Buckhannon quadrangle: Taff, 96  
 Charleston quadrangle: Campbell (M R), 01  
 Elk Garden coal field: Taff, 96a  
 Huntington quadrangle: Campbell (M R), 00a  
 Jefferson, Berkeley and Morgan cos.: Grimsley, 16  
 Kanawha Co.: Krebs, 14  
 Lewis and Gilmer cos.: Reger, 16  
 Logan Co.: Hennen, 14a  
 Mingo Co.: Hennen, 14a  
 Parker channel: Williams (E H), 01  
 Pocahontas quadrangle: Campbell (M R), 96a  
 Preston Co.: Hennen, 14  
 Raleigh Co.: Krebs, 16  
 Raleigh quadrangle: Campbell (M R), 02

## West Virginia—Continued.

*Physiographic geology*—Continued.

- Southern W. Va.: Anon, 84a  
 Tazewell quadrangle: Campbell (M R), 97  
 Terraces, Monogahela River: White (I C), 96  
 Wyoming and McDowell cos.: Hennen, 15  
*Underground water.*  
 Flowing wells on anticlines: Clapp (F G), 10d  
 Frostburg and Flintstone quadrangles: Martin (G C), 05g  
 General: Fuller, 05j  
 Nicholas quadrangle: Ashley, 05b  
 Pawpaw and Hancock quadrangles: Stose, 05a  
 Weston, T. C., biography: Bell (R), 11  
 Wewoka fauna: Girty, 11b, 15  
 Wheaton River district, Yukon Terr.: Cairnes, 10, 12  
 Wheaton quadrangle Ill.: Trowbridge, 12  
 Wheelerite: Loew, 74a  
 Wheeler's expedition, New Mexico and Arizona, 1873: Loew, 74; New Mexico and Colorado, 1874: Loew, 75b; southern California, 1875: Loew, 76a  
 Whetstones: Griswold, 92  
 Whiskey Lake area, Ont.: Coleman, 13a  
 White, C. A., biography: Benjamin, 10; Dall, 11b; Keyes, 14i  
 White, David, biography: Anon, 12c  
 White, T. G., biography: Kemp, 02d, 03d; Ries, 01b  
 White Mountains: Rogers (H D), 46  
 White River beds, S. Dak.: Wortman, 93  
 White River district, Yukon: Cairnes, 14d; McConnell, 06  
 White River copper district, Alaska: Lewington, 09  
 White River formation, origin: Matthew (W D), 99  
 Whiteaves, J. F., biography: Schuchert, 09a; Anon, 06a  
 Whitehorse district, Yukon: Cairnes, 08a; Elmen-dorf, 08; McConnell, 09  
 White Knob copper deposits, Idaho: Kemp, 07a  
 Whitepine iron deposits, Colo.: Harder, 09  
 Whitfield, R. P., biography: Clarke (J M), 11f; Gratacap, 10, 11; Hovey, 10e  
 Whitney, J. D., biography: Brewster, 09  
 Whittlesey, Charles, biography: Baldwin, 87; Winchell (A), 89f  
 Wichita beds, Tex.: Case (E C), 07c  
 Wichita formation: Gordon (C H), 11a  
 Wichita Mountains, Okla.: Vaughan, 99a  
 Wichita region, Tex.: Gordon (C H), 13  
 Willamette meteorite: Eberle, 05  
 Williams, G. H., biography: Clark (W B), 95; Clarke (J M), 95; Iddings, 94a; Williams (T), 96  
 Williams, H. S., biography: Schuchert, 18e; Weller, 18  
 Williams, J. F., biography: Kemp, 92, 92a; Anon, 91  
 Williston, S. W., biography: Brown (B), 18; Os-born, 18a  
 Williston lignite field, N. Dak.: Herald, 13  
 Wilmott, A. B., biography: Coleman, 16a  
 Willow Creek district, Alaska: Capps, 11, 14, 15b; Katz, 11  
 Winchell, Alexander, biography: Winchell (N H), 91c, 92a, c  
 Winchell, N. H., biography: Bain, 16a; Clarke (J M), 14a; Schuchert, 14d; Upham, 15a, 16



Wind gaps: Miller (A M), 15a  
 Wind River district, Wyo.: St. John, 83a  
 Wind River Mountains, Cenozoic history: Westgate, 13  
 Wind River region, Fremont and Natrona cos., Wyoming: Woodruff, 12e  
 Wind work.  
   Antigravitational gradation: Keyes, 13d  
   Arid deflation, measurement of: Keyes, 10k  
   Arid erosion, measure of: Keyes, 15m  
   Arid monadnocks: Keyes, 08e  
   Arizona, southern bolson region: Tolman, 09a  
   Base level of eolian erosion: Keyes, 09e  
   Bibliography of eolian geology: Stuntz, 11  
   Blowing of soils: Reagan, 08  
   Clay dunes: Coffey, 09  
   Coastal drift sands: Olsson-Seffer, 08  
   Corrosive efficiency of natural sand blast: Keyes, 15k  
   Deflation in desert ranges: Keyes, 09j  
   Denudation, error in estimating: Free, 09  
   Deposition in arid regions: Keyes, 11i  
   Desert depressions, origin: Hobbs, 18  
   Desert ranges: Keyes, 10f  
   Dust fall, March 9, 1918: Winchell (A N), 18, 18a  
   Effect on rocks: Leidy, 72n  
   Enisled relief: Keyes, 13i  
   Eolian action limited by ground water: Pogue, 11a  
   Eolian erosion upon varying rock-belts: Keyes, 09d  
   Epicene profiles in desert lands: Keyes, 17d  
   Erosion in the plateau country: Cross, 08a  
   Erosion under arid conditions: Keyes, 10g  
   Erosional work: Keyes, 13a  
   General: Carman, 09; Gilbert, 75b, e; Keyes, 11, 11a, i, 13c, r, 17e; Maury, 52; Merrill (G P), 92b; Russell, 89b; Tolman, 15b; Udden, 94, 14c; Walther, 92  
   Great Plains, origin: Keyes, 11, 11b  
   Intermont plains of the arid region: Keyes, 08a  
   Lake basins created by wind erosion: Gilbert, 95b  
   Lake basins of Mexican tableland: Keyes, 08e  
   Locus and character: Hobbs, 15a  
   Loess, origin and age: Savage, 16c  
   Louisiana loess, origin: Emerson (F V), 18  
   Maine: Stone (G H), 86  
   Massachusetts, Cape Cod Beach: Julien, 02  
   Mechanical composition of wind deposits: Udden, 98  
   Mexico: Virlet d'Aoust, 58a  
   Minnesota, eastern: Hall (C W), 99a  
   Movement of soil material: Free, 11  
   Navajo country: Gregory (H E), 17  
   New England: Fuller (H T), 92; southern: Woodworth, 94a  
   New Mexico: Keyes, 09a  
   North Dakota, valley filling: Collier, 18c  
   Peneplanation in arid regions: Keyes, 12a  
   Plateau plains: Keyes, 12b, e  
   Polishing of rocks, Nevada: Jackson, 66d  
   Sand-drift phenomena: Free, 09a  
   Sand polishing, San Bernardino, Cal.: Blake (V P), 55d  
   Sand sculpture: Gilbert, 74b

Wind work—Continued.  
   Sand waves: Willey, 08  
   Terracing of bajada belts: Keyes, 17a  
 Windward Islands: Hill (R T), 05c; Spencer (J W) 02, 02b  
 Windy Arm district, B. C.: McConnell, 05k, 06a, e, d; Robertson (W F), 06b  
 Wing, Augustus, biography: Seely, 01a  
 Winnfield sheet, La.: Harris, 07  
 Winslow folio, Ark.-Okla. (no. 154): Purdue, 07b  
 Wisconsin.  
   Chemical analyses: Salisbury, 83  
   Copper, dispersion in drift: Salisbury, 86  
   Diamonds: Hobbs, 94  
   Fulgurite, spiral: Hobbs, 99a  
   General: Allen (J), 34; Dopp, 13; Emmons (S F), 93; Lapham, 76; Norwood, 48; Ruggles, 36; Schoolcraft, 34, 55; Sweet, 76; Warren (G K), 76  
   Geography and industries: Whitbeck, 13  
   Geologic surveys: Blake (W P), 93c  
   Geology and physical geography: Case, 07e  
   Lead and zinc district, fieldwork: Grant (U S), 04a  
   Markings on rock: Desor, 52f  
   Measuring of postglacial time through sedimentation in lakes: Hotchkiss, 17  
   Model of State: Hotchkiss, 10  
   Rocks and minerals: Lawson (P V), 06  
   Soils: Whitson, 13  
     Marinette Co.: Weidman, 11a  
     north central Wis.: Weidman, 03  
     northwestern Wis.: Musbaeh, 14; Weidman, 11b  
   Marinette Co.: Weidman, 11a  
   Survey, biennial report: Birge, 99; Wis G S, 99; reports: Chamberlin (T C), 77, 78, 79, 80; Daniels, 58a; Hall, 58a, 61c; Lapham, 77, 77a; Whittlesey, 58a; Wight, 77  
   Water powers: Smith (L S), 08  
*Economic geology.*  
   Baraboo district: Van Hise, 11; Weidman, 04  
   Building and ornamental stones: Buckley, 98  
   Building stone, Lake Superior region: Thwaites, 12  
     Milwaukee quadrangle: Alden, 06  
     tests: Buckley, 00a  
   Central and northern Wis.: Irving, 77a  
   Central Wis.: Irving, 77  
   Chippewa land district: Owen (D D), 48  
   Clay: Buckley, 01; Ries, 06b; Milwaukee quadrangle: Alden, 06  
   Copper: Bell (W H), 44  
     Douglas Co.: Grant (U S), 00  
     Lake Superior district: Irving, 80a; Sweet, 78, 80  
     northern Wis.: Thomas (K), 00  
     southwestern area: Cox (G H), 09  
   Douglas and Bayfield eos.: Sweet, 78  
   Douglas Co., copper-bearing rocks: Grant (U S), 00  
   Eastern Wisconsin: Chamberlin (T C), 77a  
   Etna Hill ores: Wheeler (H A), 08  
   Feldspar deposits: Bastin, 10  
   General: Chamberlin (T C), 83a; Irving, 80b; Lapham, 44, 77, 77a; Murrish, 73; Norwood, 52; Owen (D D), 47, 52; Percival, 55a, 56; Wight, 77



## Wisconsin--Continued.

*Economic geology*—Continued.

Glass sand: Burchard, 06a  
 Gold, Clark Co.: Irving, 74c; glacial: Thomas (K), 02a  
 Iron: Chamberlin (T C), 78; Daniels, 54, 58, 58b; Irving, 83a; Putnam, 86  
 Baraboo district: Hille, 04a; Weidman, 04, 04b  
 Baraboo range, Sauk Co.: Rohn, 03  
 Baraboo series: Winchell (N H), 04d  
 "Clinton" ore: Thwaites, 14  
 eastern Wis., age: Savage, 16b  
 Gogebic Range: Anon, 87a  
 Lake Superior district: Brinsmade, 08g; Grant (U S), 04; Irving, 80a; Macco, 04; Parker (R A), 93; Van Hise, 92b, 01; Whittlesey, 52  
 Menominee region, Oconto Co.: Brooks (T B), 80; Wright (C E), 78, 80a  
 northwestern Wis.: Hotchkiss, 15  
 Penokee range: Lapham, 60; Whittlesey, 63b; Wright (C E), 80  
 Penokee-Gogebic region: Van Hise, 89  
 Spring Valley, brown ores: Allen (R C), 09  
 Kaolin: Irving, 76a  
 Lake Superior region: Norwood 52; Whittlesey, 52; eastern: Irving, 80a; western: Sweet, 80  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
**Lead**: Blake (W P), 93; Daniels, 54, 54a; Grant (U S), 05, 05b; Hodge (J T), 42; Murrish, 71, 72, 73; Percival, 55, 56; Strong, 83; Whitney, 62; Wright (C A), 15  
 Dodgeville: Ellis, 05  
 Hazelgreen, Grant Co.: Percival, 54  
 southwestern Wis.: Blake (W P), 93b; Chamberlin (T C), 82c; Grant (U S), 03; Strong 77  
**Lead and zinc**: Bain, 06, 11c; Brinsmade, 08f; Cox (G H), 11; Davis (R E), 06; Edwards (G E), 07; Grant (U S), 06-06b, 07; Hedburg, 06; Roethe, 96; Wheeler (H A), 06, 06a, 08  
 Limestone road materials: Hotchkiss, 14  
 Milwaukee quadrangle: Alden, 06  
 Mineral resources: Holden (E C), 13; Hotchkiss, 07  
 Mississippi region: Strong, 82  
 Molding sands: Ries, 06c  
 North-central Wis.: Weidman, 07a  
 Peat: Huels, 15  
 Penokee iron range: Irving, 78; Lapham, 60; Wright (C E), 80; Whittlesey, 59, 63b  
 Penokee-Gogebic district: Van Hise, 01, 11  
 Pyrrhotite deposit: Baggs, 13  
 Road materials: Buckley, 03  
 Sandstone, Lake Superior coast: Thwaites, 12  
 Silver, Clark Co.: Irving, 74c  
 Southwestern Wis.: Chamberlin (T C), 82c; Owen (D D), 40; Percival, 55  
 Zinc: Blake (W P), 93; Daniels, 54; George (H C), 15, 17; Grant (U S), 05, 05b; Nicholson, 03; Pulsifer, 13; Strong, 83; Wright (C A), 15  
 Dodgeville: Ellis, 05

## Wisconsin--Continued.

*Economic geology*—Continued.

Zinc: New type of deposit: Cox (G H), 12  
 Platte River district: Delestry, 08; Mathey, 08  
 Platteville district: George (H C), 10  
 southwestern Wis.: Blake (W P), 93b; Chamberlin (T C), 82c; Grant (U S), 03; (see also Lead and zinc, above.)

*Historical geology*.

Alexandrian, eastern Wis.: Savage, 15a, 16a  
 Azoic: Whittlesey, 60a  
 Baraboo Bluffs: Weidman, 95  
 Baraboo district: Van Hise, 11; Weidman, 04, 04b  
 Baraboo iron range, Sauk Co.: Rohn, 03  
 Baraboo Valley: Eaton (J H), 74  
 Beloit region: Swezey, 82  
 Blue Mound quartzite: Hubbard (G D), 00  
 Central and northern Wis.: Irving, 77a  
 Central Wis.: Hall (C W), 91b; Irving, 77  
 Chippewa land district: Owen (D D), 48  
 Clay deposits: Buckley, 01  
 Copper region: Sweet, 78  
 Copper-bearing rocks, Lake Superior, age: Irving, 74  
 Dalles of the St. Croix: Berkey, 98  
 Devil's Lake region: Eaton (J H), 72; Trowbridge, 17  
 Devonian: Cleland, 09a, 11; Monroe, 00; Milwaukee: Lapham, 60a  
 Dodge Co., metamorphic rocks: Irving, 73  
 Douglas Co., copper-bearing rocks: Grant (U S), 00  
 Eastern Wis.: Alden, 04; Chamberlin (T C), 77a  
 Flambeau Valley: King (F H), 82  
 Florence iron district: Hotchkiss, 11  
 Forest beds, Fox River: Lawson (P V), 02  
 Fox River valley, pre-Cambrian igneous rocks: Weidman, 98  
 Galena series: Sardeson, 07  
 General: Buckley, 98; Chamberlin (T C), 83; Hall, 62j; Irving, 77b, 80b; King (H), 44; Kirchoffer, 05; Lapham, 44, 51, 76, 77, 77a; Mead (D W), 94a; Norwood, 52; Owen (D D), 47, 48a, 51, 52, 52f; Percival, 55a, 56; Schultz, 05; Shumard (B F), 52; Sweet, 76; Weidman, 15; Wight, 77  
 Geologic map: Lapham, 55a, 69  
 Green Lake Co.: Alden, 12a  
 Hamilton formation, Milwaukee: Teller, 00  
 Huronian series: Irving, 79  
 Iron areas: Daniels, 58  
 Keweenaw series: Irving, 83b  
 Keweenawan rocks: Brooks (T B), 76; Winchell (N H), 95l  
 Lake deposits: Lapham, 47  
 Lake Superior district, eastern: Irving, 80a; western: Sweet, 80  
 Lake Superior region: Grant (U S), 01; Leith, 05a; Norwood, 52; Van Hise, 91, 93a; Whittlesey, 52  
 Lancaster and Mineral Point quadrangles: Grant (U S), 07  
 Lead and zinc deposits, southwestern Wis.: Grant (U S), 03



## Wisconsin—Continued.

*Historical geology—Continued.*

- Lead region: Conrad, 43b; Daniels, 54; Hodge (J T), 42; James (E), 27; Murrish, 71; Strong, 77; Whitney, 62
- Magnesian series: Hall (C W), 95
- Marquette district: Irving, 79
- Menominee iron range: Brooks (T B), 80; Wright (C E), 77, 80a
- Milwaukee quadrangle: Alden, 06
- Mineral Point quadrangle: Grant (U S), 05a
- Mississippi region: Strong, 82
- North central Wis.: Clark (A C), 78; Weidman, 07a
- Northern Wis.: Chamberlin (T C), 78; Irving, 74a, 80; Sweet, 76a
- Ordovician: Sardeson, 01c
- Paleogeography of St. Peter time: Berkey, 06
- Penokee-Gogebic iron region: Van Hise, 86, 11
- Penokee iron range: Irving, 78, 79; Whittlesey, 63b; Wright (C E), 77, 80
- Penokee series: Irving, 92
- Potsdam and Lower Magnesian formations: James (J F), 97
- Pre-Cambrian, northern Wis.: Allen (R C), 15
- Pre-Cambrian-Cambrian contact: Irving, 74b
- Preglacial gravels, Baraboo region: Salisbury, 95c
- Primordial and Canadian rocks: Irving, 75
- Primordial quartzite: Winchell (N H), 88f
- Quartzite, Barron and Chippewa cos.: Chamberlin (T C), 82d
- St. Croix Dalles: Berkey, 97
- St. Croix region: Owen (D D), 51a; Strong, 80; Wooster, 78, 82, 84
- St. Peter sandstone: James (J F), 94
- Sandstones, Lake Superior coast: Thwaites, 12
- Sauk Co.: Eaton (J H), 73; age of quartzites, etc.: Chamberlin (T C), 74, 74a; Irving, 72
- Shore of Lake Superior: Collie, 01
- Silurian: Daniels, 58c
- South central Wis.: Irving, 75
- Southeastern Wis.: Alden, 18; Lapham, 51a
- Southwestern Wis.: Chamberlin (T C), 82c; Daniels, 54a; Owen (D D), 40; Percival, 55, 56
- Sparta shale: Shipton, 16a
- Waterloo quartzite area: Buell, 93; Warner, 05
- Waukesha limestone: Rominger, 62
- Wisconsin Valley, crystalline rocks: Irving, 82a

*Mineralogy.*

- Algoma, Kewaunee Co.: Hobbs, 03
- Cerussite: Hobbs, 92c
- Diamonds: Hobbs, 96a; Kunz, 91, 94b
- Fluorite in Ordovician limestones: Bagg, 18, 18a
- Galena limestone minerals: Hobbs, 95b
- General: Hobbs, 95a; Irving, 83
- Hudsonite: Weidman, 03b
- Irvingite: Weidman, 07
- Marignasite, Wausau: Weidman, 07b
- Meteorite, Algoma, Kewaunee Co.: Hobbs, 02d
- Claywater: Smith (J L), 76c
- Colby, Clark Co.: Ward (H L), 17
- Hammond, St. Croix Co.: Cohen, 92
- Kilbourn: Farrington, 14
- St. Croix Co.: Fisher (D), 87
- Trenton, Washington Co.: Smith, 69
- Winnebago Co.: Newton, 93

## Wisconsin—Continued.

*Mineralogy—Continued.*

Pseudomorphs, limonite after marcasite: North, 13

Pyrrhotite deposit: Bagg, 13

*Paleontology.*

- Alexandrian rocks, eastern Wis.: Savage, 16a
- Aglaaspis, Potsdam: Hall, 62n
- Algae, Trenton limestone: Whitfield, 94a
- Bryozoa, Delafield: Buell, 82
- Cambrian, Ordovician, and Niagaran: Whitfield, 80a
- Cambrian, trilobites: Shumard (B F), 63
- Cambrian and Ordovician: Whitfield, 78
- Catalog of fossils: Hall, 62k
- Cristivomer namaycush, Pleistocene: Hussakof, 16c
- Devonian: Cleland, 11
- cephalopods: Cleland, 07
- Milwaukee: Monroe, 99; Crinoidea and Blastoida: Weller, 98a
- plants: Penhallow, 08
- Diatomaceae, Milwaukee: Edwards (A M), 59, 60
- Dikelocephalinae, Cambrian: Walcott, 10
- Fish spine: Teller, 06
- General: Hall, 62j; Whitfield, 82a
- Gomphoceras powersi, Beloit: James (J F), 86a
- Graptolite, St. Croix River: Prout, 51a
- Invertebrata, Ordovician and Silurian: Hall, 61c
- Lead region: Conrad, 43b
- Lingula, Trenton: Whitfield, 80c
- List of fossils: Whitfield, 83
- Mollusca, Pleistocene, Milwaukee: Baker (F C), 00
- Niagara fauna: Day (F H), 78; Hall, 60g, 67e, 71a
- Operculated gastropod from Niagara: Teller, 10
- Organic remains in iron-bearing rocks: Cayeux, 11
- Paleozoic: McChesney, 67; list: Bierbauer, 91
- Pelecypoda, Ordovician: Ulrich, 92a
- Phyllocarida, Waubesa: Whitfield, 96a
- Pisces: Newberry, 78d
- Postglacial Mollusca, Waukesha Co.: Baker (F C), 13a
- Potsdam fauna: Daniels, 58c; Hall, 63j; Winchell (A), 64; St. Croix River: Desor, 50b
- Rhynchodus excavatus: Newberry, 77
- St. Croix Dalles, Berkey, 97
- St. Croix region: Owen (D D), 51a
- Tracks on Potsdam sandstone: Todd, 82
- Trenton fossils: Walcott, 76, 79b; Whitfield, 95
- Trilobites, Potsdam: Bradley, 61
- Silurian: Raymond (P E), 16a
- Trenton horizon: Blake (W P), 94
- Types of Paleozoic fossils: Teller, 11
- Unio, Green Bay: Wagner, 05

*Petrology.*

- Ashland Co.: Julien, 80
- Baraboo Bluffs: Weidman, 95
- Central Wis.: Hall (C W), 91b
- Fayalite rocks in central Wis.: Weidman, 04a
- Flambeau Valley: Irving, 82; King (F H), 82
- Fox River valley, pre-Cambrian igneous rocks: Weidman, 98



## Wisconsin—Continued.

*Petrology*—Continued.

General: Chamberlin (T C), 83; Wright (C E), 77a

Igneous rocks: Weidman, 08

Keweenawan system, lithology: Pumpelly, 80

Lake Superior region: Wichman, 80; eastern: Irving, 80a

Menominee iron region: Brooks (T B), 80; Wright (C E), 80a

Penokee-Gogebie iron region: Van Hise, 86

Pipestone, Devil's Lake: Woodman, 82

Pre-Cambrian, Fox River valley: Hobbs, 07i

Pre-Cambrian volcanics, southern Wis.: Hobbs, 95e

Waterloo quartzite area: Buell, 93

Wisconsin Valley, crystalline rocks: Irving, 82a

*Physical geology*.

Archean quartzites, induration: Irving, 83e

Baraboo quartzite ranges: Van Hise, 93c

Crystallized sands, Potsdam sandstone: Young (A A), 82a

Dalles of the Wisconsin: Salisbury, 00

Devil's Lake region: Salisbury, 00

Fracture systems: Hobbs, 05

Fulgurites, Sparta: Shipton, 16

Ice phenomena, Green Bay: Carey, 96

Joint system: Harder, 06

Potsdam sandstone, induration: Irving, 83e

Rock fracture, Appleton: Cramer, 91

St. Peters sandstone, induration: Irving, 83e

Secondary structures in Baraboo quartzite range: Steidtmann, 10

Shoreline, peculiar formation: Case (E C), 06

*Physiographic geology*.

Algonquin beach: Goldthwait, 08a

Baraboo region: Mansfield, 08, 08a

Base level, central Wis.: Van Hise, 96a

Beaches, elevated, Lake Michigan: Leverett, 89

Boulder trains from Waterloo quartzite: Buell, 95

Dalles of the St. Croix: Berkey, 98

Dalles of the Wisconsin: Salisbury, 00; origin: Van Hise, 95a

Deposits on bluffs adjacent to the Mississippi: Squire, 08

Devil's Lake region: Eaton (J H), 72; Salisbury, 00; Trowbridge, 17

Discrimination of glacial drift sheets: Alden, 09

Drift: Bliss, 66

Devil's Lake and Baraboo: Salisbury, 97a

Milwaukee: Desor, 50h

Driftless Area: Dana (J D), 78; Hind, 64; Irving, 78a; Squier, 97

Drumlin formation: Alden, 11; Fairchild, 11a

Drumlins: Alden, 05

Dunn Co., Pleistocene: Hussakof, 16c

Fox-Winnebago Valley: Whitbeck, 15

General: Collie, 01a; Martin (L), 16

Glacial deposits, Driftless Area: Sardeson, 97b

Glacial drift sheets: Alden, 09

Glacial Lake, Fox River valley: Weidman, 11

Glacial Lake Nicolet: Upham, 03e

Glaciated and driftless areas, contrasts: Whitebeck, 11

Glaciation: Chamberlin (T C), 77a, 84c  
central Wis.: Irving, 77

## Wisconsin—Continued.

*Physiographic geology*—Continued.

Glaciation: Green Bay region: Winchell (N H), 17

Madison: Chamberlin (T C), 93f; southeastern Wis.: Alden, 09a

Interglacial clays: Berkey, 05, 07a

Joint-controlled drainage: Hobbs, 05c

Kettle holes: Whittlesey, 60

Kettle Moraine: Chamberlin (T C), 78a, b, 80a

Lake Superior coast: Collie, 01; Thwaites, 12

Lakes: Birge, 11

ancient: Knapp (J G), 72

southeastern Wis.: Fenneman, 02

Loess in Wisconsin drift: Salisbury, 96b

Meandering rivers: Kummel, 95

Northeastern Wis.: Stuntz, 70

Northwestern Wis.: Weidman, 11b

Peneplains, Driftless Area: Hughes (U B), 16

north-central Wis.: Davis (W M), 08a

preglacial, in Driftless Area: Grant, 04b

pre-Potsdam: Weidman, 03a

Physiographic geography: Martin (L), 14

Pleistocene, Saint Croix Valley: Upham, 00

Pleistocene succession: Weidman, 13

Quaternary geology, southeastern Wis.: Alden, 18

Rock terraces in Driftless Area: Martin (L), 17

St. Croix Dalles, age: Upham, 05b; glacial features: Chamberlin (R T), 05

St. Croix region drift sheets: Chamberlin (R T), 10a

St. Croix River valley: Elftman, 98a; Upham, 96q

Shore lines, eastern Wis.: Goldthwait, 07

Green Bay: Taylor (F B), 91a

Lake Superior: Taylor (F B), 94b

Southeastern Wis.: Alden, 05, 18

Southwestern Wis.: Daniels, 54a

Superglacial drift, Madison: Salisbury, 94f

Swamps: Desor, 50k

Terminal moraine: Wahnschaffe, 92

Terraces, Mississippi River: Martin (L), 18

Two pre-morainic glacial movements, Rock River valley: Swezey, 93

Wauwatosa: Bruncken, 00

Wisconsin Valley, surface deposits: Clark (A C), 82

*Underground water*.

General: Chamberlin (T C), 83a; Kirehoffer, 05;

Mead (D W), 94a; Schultz, 05; Weidman, 15

Mineral Point quadrangle: Grant (U S), 05a

Wissahiekon mica gneiss, Coatesville quadrangle, Pa.: Bliss (E F), 14

Wolframite. *See* Tungsten.

Wollastonite: Allen (E T), 06

Woman River area, Ont.: Allen (R C), 09a

Wonder district, Nev.: Ritter, 09; Zalinski, 07b

Wood replaced by calcite: Greenland, 18

Wood River district, Idaho: Lakes, 05d, 06

Woodwardia: Knowlton, 10a

Woody district, Cal.: Storms, 13c

Worcester phyllite, age: White (D), 12a

Work of rivers: Lighton, 88

World life: Winchell (A), 83

Worthen, A. H., biography: Bliss (N W), 90; Ulrich, 88b; White (C A), 95a



Wrangell district, Alaska: Wright (F E), 08  
 Wrangell Mountains, Alaska: Mendenhall, 03e  
 Wright, A. A., biography: Wilder, 07; Wright (G F), 05a  
 Wright, C. D., biography: Lawton, 88  
 Wulfenite, Utah: Hess, 08b  
 Wyoming.  
   Alkali deposits: Knight (W C), 01b  
   Badlands: McMaster, 81a  
   Bibliography: Bovee, 18  
   Big Horn Mountains: Carpenter (W L), 78  
   Black Hills region, bibliography: O'Harra, 17  
   Crandall quadrangle: Hague, 99b  
   Fossil fields expedition, 1899: Knight (W C), 00c; Schuchert, 99  
   General: Comstock, 74a; Emmons (S F), 85; Geikie, 82  
   Ishawooa quadrangle: Hague, 99b  
   Leucite Hills: Knight (W C), 03e  
   Northwestern Wyo.: Forwood, 82; Jones (W A), 74  
   State geologist, reports: Beeler, 07; Jamison, 12b; Trumbull, 14b  
*Economic geology.*  
   Aladdin quadrangle: Darton, 05b  
   Albany Co.: Beeler, 06  
   Alkali deposits: Knight (W C), 01b  
   Anticlines, central Wyo.: Hares, 16  
   Asbestos: Beeler, 10  
     Casper Mountain: Beeler, 11; Diller, 11  
     central Wyo.: Barrow, 10  
   Bald Mountain and Dayton quadrangles: Darton, 06c  
   Bald Mountain district: Smith (F D), 96  
   Bentonite: Fisher (C A), 05; Knight (W C), 98b  
     Laramie basin: Siebenthal, 06b  
     origin, Big Horn Basin: Hewett, 17a  
   Big Horn Basin: Fisher (C A), 06d; anticlines: Hewett, 17  
   Big Horn Mountain region: Darton, 06g  
   Black Hills: Darton, 01a; Scott (S), 97; Stone (R W), 12  
   Building Stone: Beeler, 08; Knight (W C), 98c  
   Cement materials: Ball (S H), 07d; Trumbull, 07a  
     Clay: Knight (W C), 98e  
     Big Horn Basin: Fisher (C A), 06d  
   Laramie Basin: Siebenthal, 06b  
     Rock Creek, Albany Co.: Knight (W C), 97b  
   Cloud Peak and Fort McKinney quadrangles: Darton, 06d  
   Coal (lignite): Beeler, 08; Jamison, 11; Hayden, 66c, 68b, 69c; Knight (W C), 95; Parsons (F W), 07a; Ricketts, 88, 90; Ritter, 06b; Trumbull, 05  
     Bald Mountain and Dayton quadrangles: Darton, 06c  
   Barber field, Johnson Co.: Wegemann, 13  
   Big Horn Basin: Fisher (C A), 04a, 06, 06d; Washburne, 09; Woodruff, 09a, 10  
   Big Horn Mountains: Darton, 06e, g  
   Black Hills: Darton, 05c, 09; Stone (R W), 12  
   Buffalo field: Gale, 10d  
   Cambria field: Simmons, 12  
   Carbon Co.: Veatch (A C), 07a  
   Diamondville field: Shurick, 08

## Wyoming—Continued.

*Economic geology—Continued.*

Coal: Fremont Co.: Jamison, 11a  
   Glenrock field: Shaw (E W), 09  
   Great Divide Basin field: Smith (E E), 09  
   Green River Basin, weathering of coal in: Schultz, 10a  
   Lander field: Woodruff, 07  
   Laramie Basin: Darton, 09f; Siebenthal, 07a  
   Little Powder River field, Campbell Co.: Davis (J A), 12  
   Little Snake River field: Ball (M W), 09, 10  
   Lost Spring field, Converse Co.: Winchester, 12  
   northeastern Wyo.: Kennedy, 07  
   northern Wyo.: Parsons (F W), 07a  
   northwestern Wyo.: Eldridge, 94a  
   Owl Creek Mountains: Darton, 06b  
   Powder River field: Stone (R W), 10a  
   Rock Springs field, Sweetwater Co.: Schultz, 09, 10  
   Sheridan field: Simmons, 12a; Taff, 09  
   southern Wyo.: Parsons (F W), 08  
   Sussex field: Wegemann, 12a  
   Sweetwater Co.: Schultz, 10a  
   Tertiary: Hodge (J T), 71  
   Uinta Co.: Knight (W C), 03e; Schultz, 07b; Veatch (A C), 06f  
   Wind River region: Woodruff, 12e  
 Copper: Beeler, 08; Kennedy, 98; Weed, 06  
   Big Horn Mountains: Darton, 06g  
   Encampment district: Beeler, 05a; Read, 04a; Spencer (A C), 03, 04  
   Hartville region: Ball (S H), 07a  
   Laramie Peak district: Beeler, 04a  
   Sunlight district: East, 11  
 Cretaceous oil and gas fields: Trumbull, 16  
 Devils Tower quadrangle: Darton, 07b  
 Douglas oil and gas field, Converse Co.: Barnett, 14  
 Eastern Wyo.: Chance, 91  
 Encampment district: Spencer (A C), 03, 04  
 Epsomite, Albany Co.: Knight (W C), 03b  
 Fourmile placer district: Snow, 95  
 Fremont Co.: Jamison, 11a  
 General: Beeler, 04, 04b, 08; Hayden, 68; Knight (W C), 93; Ricketts, 88, 90; Van Lennep, 68  
 Gold: Beeler, 08  
   Atlantic district, Fremont Co.: Spencer (A C), 16; Trumbull, 14c  
   Big Horn Mountains: Darton, 06e, g  
   Douglas Creek, Albany Co.: Snow, 95b  
   Fremont Co.: Jamison, 11  
   Owl Creek Mountains: Darton, 06  
   South Pass district: Beeler, 03, 08a  
   Sunlight district: East, 11  
   Uinta Co.: Schultz, 07a  
   Wind and Big Horn rivers: Sehrader, 14b  
 Graphite, Haystack Hills, Laramie Co.: Ball (S H), 07f  
 Gypsum: Beeler, 08; Bronson, 15, 15a; Knight (W C), 04; Trumbull, 07a  
   Big Horn Basin: Fisher (C A), 06, 06d  
   Big Horn Mountain region: Darton, 06g; Lupton, 16b



## Wyoming—Continued.

*Economic geology—Continued.*

- Gypsum: Black Hills region: Darton, 09  
 Laramie Basin: Darton, 09f, 10c; Siebenthal, 06a  
 Laramie gypsite deposit: Slosson, 00  
 Owl Creek Mountains: Darton, 06  
 Hartville quadrangle: Smith (W S T), 03  
 Iron: Aughey, 86; Beeler, 08; Leith, 06; Ricketts, 90  
 Hartville: Ball (S H), 07b; Chance, 01a; Snow, 95a  
 Iron Mountain, titaniferous ore: Ball (S H), 07c; Lindgren, 02c  
 Sunrise: Vallat, 07, 08  
 Kirwin: Hewett, 14  
 Laramie Basin: Darton, 09f  
 Laramie and Sherman quadrangles: Darton, 10c  
 Lincoln Co.: Schultz, 14  
 Magnetite, titaniferous: Kemp, 05f  
 Mica, Hartville uplift: Ball (S H), 07e  
 Mineral resources: Beeler, 05, 08; Jamison, 11  
 Moorcroft oil field, Crook Co.: Barnett, 14a  
 Natural gas, Basin field: Lupton, 16  
 Basin and Greybull field: Hintze, 15  
 Big Horn Basin: Hewett, 17; Washburne, 08  
 Byron field, Big Horn Co.: Ziegler, 17  
 Douglas field, Converse Co.: Barnett, 14  
 Grass Creek field: Hintze, 15b  
 Little Buffalo Basin oil and gas field: Hintze, 15a  
 Oregon Basin field, Park Co.: Ziegler, 17a  
 Natural soda: Ricketts, 88  
 Newcastle quadrangle: Darton, 04  
 Nitrate deposits: Gale, 12  
 North Laramie Mountains, Converse and Albany cos.: Spencer (A C), 16a  
 Northwestern Wyo.: Comstock, 74; Eldridge, 94a  
 Oil shale, Green River basin: Winchester, 16a  
 Owl Creek Mountains: Darton, 06  
 Petroleum: Aughey, 82; De la Condamine, 08; Jamison, 11; Knight (W C), 97a, 01c; Ricketts, 88; Rigge, 88; Trumbull, 13, 17  
 Basin and Greybull field: Hintze, 15  
 Basin field: Lupton, 16  
 Big Horn Basin: Hewett, 17  
 Big Horn Mountain region: Darton, 06g  
 Bonanza, Cottonwood, and Douglas fields: Knight (W C), 03  
 Byron fields: Havenor, 11; Rogers (A P), 13; Ziegler, 17  
 Cody: Hewett, 13a  
 Cretaceous: Trumbull, 16  
 Crook and Uintah cos.: Knight (W C), 99  
 Douglas field, Converse Co.: Barnett, 14; Jamison, 12  
 Dutton, Rattlesnake, Arago, Oil Mountain, and Powder River fields: Knight (W C), 01a  
 Fremont Co.: Jamison, 11a; in granite: Trumbull, 16a  
 Grass Creek field: Hintze, 15b  
 Labarge field: Schultz, 08  
 Lander field: Breger, 11a; Woodruff, 11  
 Little Buffalo Basin field: Hintze, 15a  
 Moorcroft field: Barnett, 14a  
 Muddy Creek field, Carbon Co.: Jamison, 12

## Wyoming—Continued.

*Economic geology—Continued.*

- Petroleum: Newcastle field: Knight (W C), 02  
 Oregon Basin field, Park Co.: Ziegler, 17a  
 origin: Chautard, 13  
 Pilot Butte field, Fremont Co.: Ziegler, 16  
 Popo Agie, Lander, and Shoshone fields: Knight (W C), 97  
 Powder River field: Wegemann, 12  
 Salt Creek field, Natrona Co.: Jamison, 12a; Knight (W C), 96, 96a; Trumbull, 14a; Wegemann, 11, 18  
 Shoshone anticlinal: Knight (W C), 97  
 Shoshone River: Hewett, 14b  
 Spring Valley field: Merrill (F J H), 12  
 Teapot dome: Wegemann, 18  
 Uinta Co.: Knight (W C), 02b; Veatch (A C), 06f  
 Phosphate deposits: Blackwelder, 11; Breger, 11a; Duffield, 10; Gale, 10b; Jones (C C), 07, 13; Van Horn (F B), 09; Waggaman, 10; Weeks, 07a, 08c  
 Salt River Range: Mansfield, 16a  
 Phosphate and coal, western Wyo.: Schultz, 18  
 Platinum: Taft, 18; in copper ores: Emmons (S F), 03b; Rambler mine: Kemp, 04a  
 Potash-bearing rocks, Leucite Hills, Sweetwater Co.: Schultz, 12  
 Potassium nitrate: Knight (W C), 01d  
 Rare metals, Rambler mine: Knight (W C), 02a; Read, 03a  
 Rock Springs uplift and Dry Lake dome, geologic map: Trumbull, 15  
 Salt resources: Breger, 10  
 Salt River Range: Mansfield, 16a  
 Shoshone River section: Hewett, 14b  
 Soda: Knight (W C), 98a  
 Sodium salts deposits: Schultz, 10b  
 Silver, Sunlight district: East, 11  
 Sulphur: Beeler, 08; Trumbull, 07  
 Cody: Woodruff, 08  
 Park Co.: Hewett, 14a  
 Sunlight Basin: Hewett, 13  
 Thermopolis: Woodruff, 09b  
 Sundance quadrangle: Darton, 05a  
 Sweetwater district: Endlich, 79; Knight (W C), 01  
 Taylorite, Rock Creek: Knight (W C), 97b  
 Titanic iron ores, microstructure: Warren (C H), 18  
 Titaniferous iron ore, Albany Co.: Kemp, 05e  
 Western Wyo.: Schultz, 18  
*Historical geology.*  
 Absaroka Range: Hague, 99b, c  
 Aladdin quadrangle: Darton, 05b  
 Amsden formation, Wind River Mountains: Branson, 18  
 Anticlines, central Wyo.: Hares, 16  
 Atlantosaur beds: Peck, 04a  
 Atlantic district, Fremont Co.: Spencer (A C), 16; Trumbull, 14  
 Bald Mountain and Dayton quadrangles: Darton, 06c; Salisbury, 06  
 Baptanodon beds: Gilmore, 05  
 Barber coal field, Johnson Co.: Wegemann, 13  
 Bear River formation: Hayden, 70a; Stanton, 92; White (C A), 92, 95  
 Bear River region: Cope, 73u



## Wyoming—Continued.

*Historical geology—Continued.*

- Big Horn Basin: Fisher (C A), 06; Lupton, 16, 16c; Sinclair, 12b; Woodruff, 10; Wortman, 82; anticlines: Hewett, 17
- Big Horn Co.: Hintze, 15
- Big Horn dolomite, origin: Blackwelder, 13b
- Big Horn Mountains: Carpenter (W L), 78; Darton, 02e, 04c, 06e; southern part: Lupton, 16b
- Big Horn River region: Cope, 80c
- Big Muddy and Douglas oil and gas fields, map: Wyo St G, 15
- Big Muddy dome, Converse and Natrona cos.: Barnett, 14b
- Bitter Creek coal series: Cope, 73l
- Black Hills: Darton, 01a, 09; Scott (S), 97; Stone (R W), 12
- Bonanza, Cottonwood, and Douglas oil fields: Knight (W C), 03
- Borings, Union Pacific Railroad: Hayden, 77b
- Bridger Basin: Osborn, 81
- Bridger beds: Sinclair, 06a
- Buffalo coal field: Gale, 10d
- Byron field, Big Horn Co.: Ziegler, 17
- Central Wyo.: Hares, 16
- Ceratops beds: Stanton, 09a; Converse Co.: Hatcher, 93
- Cloud Peak and Fort McKinney quadrangles: Darton, 06d; Salisbury, 06a
- Cody region: Sinclair, 12a
- Coal, geological age: Cope, 72q; Marsh, 73e
- Crandall Basin: Iddings, 94b, 99d
- Cretaceous: Cope, 73x; Hares, 16a; Trumbull, 05
- correlation: Hares, 17a
- southern Wyo.: Heroy, 15
- Cretaceous and Eocene formations: correlation: Hares, 15
- Devils Tower quadrangle: Darton, 07b
- Dinosaur beds: Williston, 78
- Douglas oil and gas field, Converse Co.: Barnett, 14; Jamison, 12
- Dutton, Rattlesnake, Arago, Oil Mountain, and Powder River oil fields: Knight (W C), 01a
- Eastern Wyo.: Adams (G I), 02
- Embar and Chugwater formations, central Wyo.: Condit, 16
- Embar formation: Branson, 16
- Encampment district: Spencer (A C), 04
- Eocene, Big Horn Basin: Sardeson, 01e
- Eocene faunal horizons: Granger, 14
- Fossil fields: U P R Co, 09
- Fox Hills formation: Stanton, 15b
- Fox Hills sandstone and Lance formation: Stanton, 10a
- Fremont Co.: Jamison, 11a
- Frontier formation, southwestern Wyo.: Knowlton, 17a
- General: Aughey, 82; Darton, 18a; Engelmann, 76; Hague, 77; Hayden, 62, 68, 69c, 71; Hines, 69; King (C), 78a; Knight (W C), 93, 00; Lesquereux, 73a; Meek, 60a, 73; Ricketts, 88; Rigge, 88; Trumbull, 17; Van Lennep, 68; Anon, 72
- Geologic map: Hayden, 72a

## Wyoming—Continued.

*Historical geology—Continued.*

- Geologic map: central Wyo.: U S G S Terr, 83
- western Wyo.: U S G S Terr, 83a, b, c
- Grass Creek oil and gas field: Hintze, 15b
- Green River Basin: Davis (W M), 03; Peale, 79
- Hailey shales: Williston, 05c
- Hanna Basin: Bowen (C F), 16, 18
- Hartville quadrangle: Smith (W S T), 03
- Hay Creek coal field: Jenney, 99
- Hell Creek and Ceratops beds: Knowlton, 09
- Iron Mountain, southeastern Wyo.: Lindgren, 02c
- Jefferson limestone: Kindle, 08b
- Jurassic, Black Hills: Loomis, 02
- Freeze-out Hills: Logan, 00a
- southeastern Wyo.: Knight (W C), 00a; Loomis, 01
- Juratias, western Wyo.: Peale, 79a
- Lance formation: Knowlton, 11a; Niobrara Co. Lull, 15c
- Lance Creek beds: Hatcher, 03b
- Lander oil field: Knight (W C), 97; Woodruff, 11
- Laramie: Stanton, 97; Williston, 02i; definition and origin: Veatch (A C), 07
- Laramie and Sherman quadrangles: Darton, 10c
- Laramie beds of Converse Co.: Sternberg, 09a
- Laramie group, western Wyo.: Peale, 79b
- Laramie Mountains: Darton, 16a
- Laramie region: Blackwelder, 09a; Darton, 09f
- Lignitic group: Hayden, 76a
- Lincoln Co.: Schultz, 14
- Little Buffalo Basin oil and gas field: Hintze, 15a
- Little Powder River coal field: Davis (J A), 12
- Little Snake River coal field: Ball (M W), 10
- Loup Fork beds: Riggs, 09
- Lost Spring coal field, Converse Co.: Winchester, 12
- Medicine Bow Range: Blackwelder, 18c
- Miocene: Peterson, 06c
- Morrison formation: Knowlton, 16g; Mook, 16; age: Schuchert, 18a
- Muddy Creek oil field, Carbon Co.: Jamison, 12
- Newcastle oil field: Knight (W C), 02
- Newcastle quadrangle: Darton, 04
- Niobrara beds: Loomis, 08c
- North Laramie Mountains, Converse and Albany cos.: Spencer (A C), 16a
- Northwestern Wyo.: Comstock, 74; Eldridge, 94a
- Oil fields, Creek and Uinta cos.: Knight (W C), 99
- Oolites, Wind River Mountains: Tarr (W A), 18b
- Ordovician: Darton, 06b
- Oregon Basin field, Park Co.: Ziegler, 17a
- Owl Creek Mountains: Darton, 06
- Paleozoic and Mesozoic of central Wyo.: Darton, 08
- Park Co.: Dake, 18a
- Patrick and Goshen Hole quadrangles: Adams (G I), 02
- Pilot Butte oil field, Fremont Co.: Ziegler, 16
- Popo Agie oil field: Knight (W C), 97



## Wyoming—Continued.

*Historical geology*—Continued.

- Powder River basin: Wegemann, 12, 17  
 Pre-Cambrian rocks, southeastern Wyo.: Blackwelder, 08  
 Red beds, age and origin, southeastern Wyo.: Knight (S H), 17a  
 Laramie Mountain region: Darton, 07e  
 lithogenesis and stratigraphy, southeastern Wyo.: Knight (S H), 16  
 western Wyo., origin: Bronson, 15  
 Rock Springs coal field, Sweetwater Co.: Schultz, 10  
 Rock Springs uplift and Dry Lake dome, geologic map: Trumbull, 15  
 Rocky Mountain region, Paleozoic: Tomlinson, 17  
 Salt Creek oil field, Natrona Co.: Jamison, 12a; Knight (W C), 96; Trumbull, 14a; Wegemann, 11, 18  
 Salt River Range: Mansfield, 16a  
 Silurian, Big Horn Mountains: Beecher, 96d  
 Shoshone oil field: Knight (W C), 97  
 Shoshone River section: Hewett, 14b  
 Southern Wyo.: White (C A), 89  
 South Pass gold district, Fremont Co.: Beeler, 03  
 Southwestern Wyo.: Powell, 76  
 Sundance quadrangle: Darton, 05a; Smith (W S T), 05  
 Sunshine, Park Co., anticlines: Moody, 18  
 Sussex coal field, Johnson, Natrona, and Converse cos.: Wegemann, 12a  
 Sweetwater district: Endlich, 79; Knight (W C), 01  
 Tertiary, Green River: Davis (W M), 03h  
 faunal horizons in Wind River Basin: Granger, 10  
 northwestern Wyo.: Sinclair, 11  
 Teton Range region: St. John, 79  
 Titanotherium beds: Peck, 04a  
 Union Pacific: Bannister, 73  
 Vermilion Creek beds: Davis (W M), 00a  
 Wasatch deposits, origin: Loomis, 07a  
 Washakie Basin: McMaster, 81; Osborn, 81  
 Washakie formation: Sinclair, 09; faunal horizons: Granger, 09  
 Wayan quadrangle: Mansfield (G R), 16e  
 Western Wyoming: Blackwelder, 18b; Comstock, 73; Condit, 18; Schultz, 18; geologic history: Blackwelder, 15  
 Wind River and Big Horn basins: Sinclair, 11a  
 Wind River district: St. John, 83a  
 Wind River Range: Endlich, 79  
 Wind River region coal fields, Fremont and Natrona cos.: Woodruff, 12c

*Mineralogy*.

- Alkali, Bridger Valley: Goldsmith, 78  
 Calcite-sand crystals, Goshen Hole region: Barbour, 02b  
 Covellite from Rambler mine: Rogers (A F), 11  
 Epso lite, Laramie: Farrington, 00  
 Gaylussite, Sweetwater Valley: Farrington, 00  
 Lorandite, Rambler mine: Rogers (A F), 12b  
 Meteorite, Laramie Co.: Kunz, 88b  
 Minerals, list: Aughey, 86  
 Mordenite: Pirsson, 90

## Wyoming—Continued.

*Mineralogy*—Continued.

- Sheridan Co.: Wolff, 12  
 Sperrylite: Wells, 02

*Paleontology*.

- Adocus, Cretaceous: Cope, 70g  
 Agathaumas, Black Buttes: Cope, 73f  
 Age and localities of supposed Jurassic fossils: Veatch (A C), 06a  
 Algal reef, Teton Mountains: Blackwelder, 15a  
 Allosaurus: Matthew (W D), 08  
 Amphibia, Green River shale: Cope, 73zg  
 Amsden fauna: Blackwelder, 13; Wind River Mountains: Branson, 18  
 Anaptomorphus, Green River Basin: Cope, 73j  
 Angistorhinus, Triassic phytosaur: Mehl, 13  
 Apternodus, skull: Matthew (W D), 10  
 Araucarias, Cretaceous: Wieland, 10  
 Araucarioxylon, Carbon Co.: Knowlton, 00b  
 Armadillo, Bridger formation: Osborn, 04  
 Astrodon, Atlantosaurus beds: Hatcher, 03a  
 Atlantosaurus beds: Peck, 04a  
 Badlands: McMaster, 81a  
 Baena hatcheri, Laramie: Hay (O P), 01  
 Baptanodon, Jurassic: Gilmore, 02, 05, 06, 07a  
 Bathmodon: Cope, 83f  
 Bathypopsis, Wind River Uintathere: Osborn, 13c  
 Big Horn River region: Cope, 80o  
 Bird remains: Shufeldt, 13e  
 Jurassic: Marsh, 81b  
 Wasatch: Loomis, 06a  
 Brontosaurus, Albany Co.: Hatcher, 02b  
 Camarasaurus: Osborn, 98f  
 Camels, Harrison beds: Loomis, 11  
 Carnivora, Eocene: Cope, 73z  
 Carnivora and Insectivora of Bridger Basin Eocene: Matthew (W D), 09  
 Ceratopsia, Converse Co.: Hatcher, 05, 07  
 Chara, Bear River formation: Knowlton, 93c  
 Chisternon: Leidy, 72h  
 Claosaurus: Beecher, 02c  
 Coelosuchus reedii: Williston, 06  
 Collecting: Riggs, 00  
 Converse Co.: Sternberg, 11  
 Coralline algae in Ordovician dolomite: Blackwelder, 13c  
 Crawfish, Tertiary: Packard (A S), 80, 81, 81b  
 Cretaceous: Meek, 60c; Trumbull, 05  
 Mammalia: Marsh, 89c  
 plants, Hay Creek coal field: Fontaine, 99  
 Sage Creek: Evans (J), 54a  
 Crocodilus: Leidy, 70n  
 Cycad localities: Marsh, 98b  
 Cycadeoideae: Wieland, 16; Jurassic: Ward (L F), 00c  
 Diatryma, Big Horn Basin: Matthew (W D), 17, 17e  
 Dinictis, White River formation: Riggs, 96  
 Dinoceras: Marsh, 72m  
 Dinocerata: Gaudry, 85; Marsh, 73f, 86; Scott (W B), 86  
 Dinosaur, Lance formation: Gilmore, 13  
 Dinosauria: Gilmore, 14; Jurassic: Osborn, 00  
 Elephas: Knight (W C), 03d  
 Elosaurus, Albany Co.: Peterson, 02  
 Embar formation: Branson, 16



## Wyoming—Continued.

*Paleontology*—Continued.

- Eobasileus galeatus, Bitter Creek: Cope, 74n  
 Eocene: White (C A), 81e  
   Bridger Basin: Osborn, 78  
   Green River: Cockerell, 09j  
   Mammalia: Cope, 73n; Wortman, 01a  
   Pisces: Cope, 85v  
   Vertebrata: Cope, 73, 82a  
 Eohippus: Granger, 11  
 Eomoropus: Osborn, 13a  
 Figs, fossil: Knowlton, 11d  
 Fossil collecting, 1900: Hatcher, 00  
 Fossil fields: U P R Co., 09  
 Fossil forests, Yellowstone National Park  
   Knowlton, 14b  
 Frontier formation, flora: Knowlton, 17a  
 Gallinuloides: Eastman, 00c; Green River  
   shales: Lucas (F A), 00d  
 Gallinuloides wyomingensis: Shufeldt, 15b  
 Gastroliths, Cloverly formation, Big Horn  
   Basin: Hares, 17  
 Gastropoda, Tertiary: Cockerell, 15  
 Gleichenia, Cretaceous: Knowlton, 13a  
 General: White (C A), 79d  
 Goniobasis, Tertiary: Conrad, 69c  
 Goniopholis? gilmorei, Jurassic: Holland, 05  
 Green Mountain region: White (C A), 77c  
 Hyopsodidae: Loomis, 05  
 Ichthyosaur-like remains, Benton formation:  
   Merriam (J C), 05d  
 Iguanodont dinosaur, epidermis: Osborn, 09a  
 Insecta, Green River shales: Scudder, 78a  
 Insects, Tertiary deposits: Cockerell, 08a  
 Invertebrata: Meek, 72a, 76e  
 Jefferson limestone fauna: Kindle, 08b  
 Jurassic: Meek, 60c  
   crinoid: Springer, 09  
   cycads: Ward (L F), 05  
   Freeze-out Hills: Logan, 00a  
   frog: Moodie, 12c  
   plesiosaurs: Mehl, 12a  
   reptiles: Marsh, 79i  
   saurians: Knight (W C), 00b  
   vertebrates: Knight (W C), 98  
 Labyrinthodontidae: Branson, 05a  
 Lance fauna, Niobrara Co.: Lull, 15c  
 Laramie Invertebrata: White (C A), 78  
 Leidyosuchus sternbergi, Ceratops beds: Gil-  
   more, 10  
 Lepidosteus, Green River shales: Eastman, 00a  
 Limnofelis, Tertiary: Marsh, 72p  
 Limnhyops: Earle, 92  
 Lophiotherium, Green River, Wyo.: Leidy, 70u  
 Loup Fork fauna: Riggs, 09  
 Loxolophodon, Eocene, southern Wyo.: Cope,  
   73g  
 Macelognatha: Marsh, 84a  
 Mammalia: Cope, 73ze; Leidy, 70o, q, 71d, 72d,  
   e, k, m, 73b; Marsh, 71f  
   Eocene: Marsh, 73c  
   Wasatch and Wind River beds: Osborn, 92  
 Mesonyx, Twin Buttes: Scott (W B), 88a  
 Mesozoic and Cenozoic plants: Knowlton, 10a  
 Metalophodon, Eocene: Cope, 72t  
 Miocene vertebrates: Sternberg, 13  
 Mollusca, Eocene: White (C A), 83h

## Wyoming—Continued.

*Paleontology*—Continued.

- Montana flora: Knowlton, 00  
 Morosaurus, sacrum, Converse Co., Wyo.: Wil-  
   liston, 98a  
 Mosasaur, Ft. Pierre shale: Loomis, 15  
 Neuroptera, Green River: Scudder, 82f  
 Notharctus: Granger, 17  
 Notogoneus: Woodward (A S), 96  
 Oligocene vertebrates: Matthew (W D), 10  
 Oreodon culbertsonii, restoration: Stewart (A),  
   97  
 Ornitholestes, Bone Cabin quarry: Osborn 03a,  
 Orthocynodon, Bridger beds: Scott (W B), 82,  
   83  
 Ostracoda, Cretaceous, southwestern Wyo.:  
   Jones (T R), 93  
 Palaeonictis, Wasatch beds: Osborn, 92g  
 Paleorhinus, skull: Lees, 07  
 Palaeosyops: Earle, 91a, 92; Leidy, 70q, 71e  
 Park City formation: Girty, 10  
 Patriofelis: Leidy, 70d; Wortman, 94  
 Peccaries, new genus: Loomis, 10a  
 Perissodactyla, Bridger Eocene: Cope, 73m  
 Phenacodus: Cope, 86d  
 Pisces: Cope, 77u; Bridger beds: Leidy, 73d  
   Eocene: Whitfield, 90a  
   Green River: Cope, 70h, 71a, 77c; Jordan, 10  
 Plantae: Newberry, 83f; Morrison formation:  
   Knowlton, 16g  
 Plesiosaur, Jurassic: Knight (W C), 95a  
 Pleurodira, Eocene: Cope, 73u  
 Poposaurus gracilis, Triassic: Mehl, 15a  
 Pterodactyl, Jurassic: Marsh, 78d  
 Quadrumana, Eocene: Marsh, 72o  
 Reptilia: Leidy, 70b, s  
   Baptanodon beds: Marsh, 95  
   Green River Basin: Cope, 73k; Marsh, 72j  
   Laramie formation: Marsh, 92d  
   Tertiary: Marsh, 71c  
 Rhynchocephalian reptile, Jurassic: Gilmore,  
   09a  
 Rodentia, Converse Co.: Peterson, 05  
 Sabal rigida, Laramie, Converse Co.: Hatcher,  
   01c  
 Saurians: Marsh, 91d  
 Sauropoda, Bone Cabin quarry: Osborn, 01  
 Serpents, Tertiary: Marsh, 71b  
 Sinopa, osteology: Matthew (W D), 06  
 Southwestern Wyo.: White (C A), 76  
 Starfish, Cretaceous: Weller, 05c  
 Stegopelta landerensis: Williston, 05c  
 Stegosaurus: Gilmore, 18  
 Tertiary: Meek, 60c, 71  
   faunal horizons in Wind River Basin:  
     Granger, 10  
   Insecta: Scudder, 78  
   Mollusca: Cockerell, 14, 11b  
   Plantae: Lesquereux, 72  
   Vertebrata: Leidy, 72  
 Testudo: Leidy, 71f  
 Titanotheres: Osborn, 13b  
 Trachodon, integument: Osborn, 12d; Laramie  
   beds, Converse Co.: Sternberg, 09  
 Triassic reptiles: Williston, 04a; Vertebrata,  
   Lander: Williston, 05b



## Wyoming—Continued.

*Paleontology*—Continued.

Triceratops prorsus, Converse Co.: Gilmore, 05a

Trionychidae, Bridger beds: Hay (O P), 04c

Turtles: Hay (O P), 04; Leidy, 71b, 73a

Eocene: Cope, 73zh

Lance formation: Gilmore, 16c

Oligocene: Lambe, 13b

Theseelosaurus, Lance formation: Gilmore, 15b

Titanotherium beds: Peck, 04a

Tithymalus, Clark Fork basin: Cockerell, 14g

Uintatherium: Cope, 83f

Ungulata, Eocene: Cope, 73y

Unio, Tertiary, Cockerell, 15a

Vertebrata: Cope, 73q, r, s; Leidy, 69a, 71j; Marsh, 71e

Bitter Creek: Cope, 73h, i

Bridger group, Cottonwood Creek: Cope, 73e, d, e

Fort Bridger: Leidy, 71g

Miocene: Peterson, 06c

Wasatch and Wind River faunas: Matthew (W D), 15a; rodents: Loomis, 07

Wasatch vertebrates: Loomis, 07a

Wind River beds, Vertebrata: Cope, 81c

Woods, fossil: Platen, 08, 09

Xiphotrygon, Green River shales: Cope, 79k

Xylophomya, Alkali Creek: Whitfield, 02b

*Petrology.*

Aladdin quadrangle: Darton, 05b

Big Horn Mountains: Darton, 06e

Crandall Basin: Iddings, 94b, c, 99d

Encampment district: Spencer (A C), 04

Eocene formations, Rocky Mountains, petrographic characters: Johannsen, 14a

General: Hill (B F), 99

Leucite Hills: Cross, 97; Kemp, 97a, 03

Leucite rock, Absaroka Range: Hague, 89

Obsidian, Yellowstone National Park: Holmes, 79a

Pilot Butte: Cross, 97

Rhyolite, Glade Creek: Iddings, 91a

Volcanic rocks: Iddings, 96a

Yellowstone National Park: Iddings, 96

*Physical geology.*

Alkali deposits: Read, 04

Anticlines, central Wyo.: Hares, 16

Baked clays and natural slags: Bastin, 05

Big Horn Basin, anticlines: Hewett, 17

Big Horn Mountains, glacial sculpture: Matthes, 00

Bull Lake Creek rock slide, Wind River Mountains: Branson, 17a

Disruption of rock by lightning: Barnett, 08b

General: Darton, 18a

Glaciers: Hayden, 78e

Gros Ventre slide: Blackwelder, 12b

Hart Mountain overthrust, Park Co.: Dake, 18a

Northwestern Wyo.: Comstock, 74; Eldridge, 94a

Silica and lime deposition, Yellowstone National Park: Darton, 12b

*Physiographic geology.*

Absaroka Range: Hague, 99c; volcanic history: Hague, 01

Bates Hole: Knight (W C), 01e

## Wyoming—Continued.

*Physiographic geology*—Continued.

Big Horn Mountains: Darton, 07c

drainage modifications: Mansfield, 06

glacial sculpture: Matthes, 00, 00a

glaciation: Salisbury, 03, 06b

Bishop conglomerate: Rich, 10

Cenozoic history of central Wyo.: Baker (C L), 12a

Central western Wyo., post-Cretaceous history: Blackwelder, 14a

Cody region: Sinclair, 12a

Glacial field, Wind River Mountains: Blackburn, 81

Glaciers, Wind River Mountains: Hayden, 78g

Green River Basin: Davis (W M), 03

Jackson Basin, northwestern Wyo.: Weeks, 99

Leucite hills: Kemp, 03

Natural bridges in eastern Wyo.: Barnett, 12

Northwestern Wyo.: Comstock, 74

Western Wyo., geologic history: Blackwelder, 15

Wind River Mountains, Cenozoic history: Westgate, 13

*Underground water.*

Aladdin quadrangle: Darton, 05b

Black Hills: Darton, 01a, 09

Borings, Union Pacific Railroad: Hayden, 77b

Eastern Wyo.: Bailey (G E), 90

General: Knight (W C), 00

Hot springs at Thermopolis: Darton, 06a

Laramie and Sherman quadrangles: Darton, 10c

Laramie Basin: Darton, 09f

Lodgepole Valley: Meinzer, 17a

Newcastle quadrangle: Darton, 04

Wyoming buried valley: Lyman, 02a

Wyomingite, extraction of potash from: Wells, 16

Xiphosura, Carboniferous: Packard (A S), 87

Xiphosuran, Permian, Kansas: Beecher, 04

Yakima Co., Wash.: Smith (G O), 01

Yakutat coastal plain, Alaska: Blackwelder, 09b

Yakutat Bay region, Alaska: Tarr, 06, 06e, 06e; 09, 09a

Yampa coal field, Colo.: Fenneman, 06b

Yampa River, Colo., history: Hancock, 15

Yarmouth: Leverett, 98a

Yeates, W. S., biography: McCallie, 09; Merrill (G P), 10

Yellow Pine district, Clark Co., Nev.: Gregory (N B), 10a; Hill (J M), 14a; Palmer (L A), 16b

## Yellowstone National Park.

Gas spring: Weed, 89e

General: Aekermann, 75; Bradley, 73, 73b, 79; Comstock, 74, 74b; Crook, 97; Doane, 71; Emmons (S F), 93; Fenneman, 13; Forwood, 82; Geikie, 78, 82; Hague, 84a, 99, 04; Hayden, 72, 72d; Ludlow, 76; Martonne, 13; Peale, 73; Richardson (J), 73; Toulia, 87a

Geologic history: Hague, 88, 12

Geyser water and deposits: Leffmann, 83

Geysers: Cadell, 92; Chaix, 15; Comstock, 76a; 77; Leclercq, 85; Peale, 77d, 83, 84; Weed, 12e; Anon, 73a; decline: Barbour, 99b

Geysers and hot springs: Hayden, 72c



**Yellowstone National Park—Continued.**

- Obsidian Cliff: Iddings, 88
- Scorodite, deposition: Hague, 87
- Silica and lime deposition: Darton, 12b
- Sinter, siliceous, formation: Weed, 89a
- Thermal springs: Peale, 72, 83
- Thermal waters: Hague, 11
- Radioactivity: Schlundt, 09
- Volcano, Crandall Basin: Iddings, 93

**Mineralogy.**

- Calcite in silicified wood: Wherry, 17
- Fayalite: Iddings, 85
- General: Rath, 86d
- Sulphur, orpiment, and realgar: Weed, 91c

**Historical geology.**

- Diatomaceous beds: Weed, 89b
- General: Holmes (W H), 83; Weed, 96
- Geologic map: U S G S Terr, 83d
- Geologic relief map: Hague, 99d

**Paleontology.**

- Cambrian fossils: Walcott, 99
- Devonian and Carboniferous fossils: Girty, 99a
- Fossil forests: Holmes (W H), 79; Knowlton, 98c, 14b; Weed, 92a
- Mesozoic fossils: Stanton, 99
- Tertiary floras: Knowlton, 96b, 99
- Wood: Felix, 96; Platen, 09

**Petrology.**

- General: Rath, 86d
- Geyserite pebbles: Comstock, 76
- Igneous rocks: Beam, 83; Iddings, 90a, 96; age: Hague, 96a
- Electric Peak and Sepulchre Mountain, eruptive rocks: Iddings, 91
- Spherulites: Parkinson, 01a
- Volcanic rocks: Dutton, 83; Eccles, 81; Rutley, 81

**Physiographic geology.**

- General: Martonne, 15
- Glaciation: Holmes (W H), 81

**Underground water.**

- Analyses of waters: Gooch, 88
- Yellowstone National Park folio, Wyo. (no. 30): Hague, 96
- Yellowstone region: Hayden, 61
- Yentna district, Alaska: Capps, 13; gold placers: Capps, 12a
- Yerington copper district, Nev.: Carpenter (J A), 10a; Jennings, 07; Ransome, 09e
- Yoho Glacier, B. C.: Wheeler (A O), 07a, 08, 09, 10
- York tin region, Alaska: Collier, 04; Hess, 06
- Yosemite National Park: Turner, 99e
- Yosemite Valley: Clark (G), 10; French, 14; Johnson (D W), 10; Matthes, 11, 12, 14a; El Capitan moraine: Matthes, 10b; glaciers: Kneeland, 72; Hanging valleys: Johnson (D W), 11c; origin: Blake (W P), 00; Johnson (D W), 10; Le Conte, 73
- Yttocrasite: Hidden, 06

**Yucatan.**

- General: Heilprin, 91b; Huntington, 12a

**Economic geology.**

- Gypsum: Howe, 96

**Historical geology.**

- General: Sapper, 96

**Paleontology.**

- General: Deshayes, 53

**Yucatan—Continued.****Physiographic geology.**

- Coast region: Schott, 66

**Yukon.**

- Alaska-Yukon boundary between Poreupine and Yukon rivers: Cairnes, 12a
- Bibliography of geology and mining industry: Gwillim, 08
- Conrad and Whitehorse districts: Cairnes, 08a
- General: Dawson (G M), 88; McConnell, 99; Tyrrell, 14a
- Mackenzie Mountains, reconnaissance: Keele, 10
- Macmillan River: McConnell, 03
- Mining and mining methods: Paré, 08
- Muck beds, frozen, Klondike district: Tyrrell, 17
- Peel River region: Camsell, 06, 06b
- Pelly River basin: Keele, 09
- Postglacial climatic changes: McConnell, 10
- Publications, recent, relating to: Brooks (A H), 06b
- Southwestern Yukon: Tyrrell, 99
- Stewart River region: Keele, 06a
- Wheaton River district: Cairnes, 10
- Whitehorse copper belt: McConnell, 09
- Whitehorse-Tantalus region: Cairnes, 08, 09
- White River district: Cairnes, 14d; McConnell, 06
- Yukon basin: McConnell, 91
- Economic geology.**
- Antimony, Wheaton district: Cairnes, 10e, 11a, 16
- Coal: Cairnes, 09, 10b, 12g, 13b; Denis, 12; Payne, 14
- Conrad and Whitehorse districts: Cairnes, 08a
- Lewes and Nordenskiöld rivers district: Cairnes, 10a
- southern Yukon: Cairnes, 07a
- Tantalus: Cairnes, 08, 13a
- Wheaton district: Cairnes, 12
- Conrad and Whitehorse districts: Cairnes, 08a
- Copper: Brewer, 05; Brock, 10a; Cairnes, 09
- Hutshi River district: Cairnes, 10a
- Wheaton River district: Cairnes, 10
- Whitehorse district: Brewer, 02, 03, 04; Elmendorf, 08; McConnell, 01, 09; Paré, 08; Rickard, 08c; Stretch, 00; Stutzer, 09
- White River region: Cairnes, 06a; McConnell, 06, 06d
- Duncan Creek district: Keele, 05
- General: Annes, 15; Cairnes, 16a; McConnell, 01; Tyrrell, 14a
- Gold: Cairnes, 11b, 16a; Dawson (G M), 88; Dunn, 97; Lincoln, 11a; McConnell, 02; Miers, 01; Ogilvie, 97; Paré, 08; Penrose, 03; Tyrrell, 14a
- Conrad and Whitehorse districts: Cairnes, 08a
- Duncan Creek district: Keele, 05
- Klondike district: Bel, 04, 05; Bell (R), 10; Bratnober, 97; Cadell, 14; Cairnes, 12b, 13a; Dunn, 98; Everette, 07; Heilprin, 99; McConnell, 99a, 00, 00a, b, 04, 05, 06b; MacLean (T A), 13, 14; Mendenhall, 02a; Miers, 03; Nordenskiöld, 99; Tyrrell, 99b, 12b; concentration of gold in: Tyrrell, 07
- Kluane district: McConnell, 05a
- Mayo area: Cairnes, 16



## Yukon—Continued.

*Economic geology—Continued.*

- Gold: placer deposits: Tyrrell, 12a  
 Scroggie, Barker, Thistle, and Kirkman creeks: Cairnes, 17  
 Sixtymile and Ladue valleys: Cockfield, 18  
 southwestern Yukon: Cairnes, 15a  
 upper White River district: Cairnes, 15  
 values in high-level gravels: McConnell, 07  
 Wheaton River district: Cairnes, 10, 12  
 Whitehorse region: Cairnes, 06a; Everette, 07; McConnell, 06, 07; Tyrrell, 07  
 Klotassin area: Cairnes, 17a  
 Lead, Wheaton district: Cairnes, 12  
 Lewis River region: Heydon, 99  
 Lignite: McConnell, 01  
 Mayo area: Cairnes, 16  
 Ore and coal-bearing formation: Cairnes, 12f  
 Scroggie, Barker, Thistle, and Kirkman creeks: Cairnes, 16  
 Silver, Conrad and Whitehorse districts: Cairnes, 08a  
 Southern Yukon: Cairnes, 07a  
 Wheaton River district: Cairnes, 10, 12  
 Whitehorse region: Cairnes, 06a  
 Whitehorse-Tantalus region: Cairnes, 09  
 White River region: McConnell, 06  
 Windy Arm region: McConnell, 05b, 06a, c, d  
 Sixtymile and Ladue valleys: Cockfield, 18  
 Southwestern Yukon: Cairnes, 15a  
 Tungsten, Dublin Gulch: Cairnes, 17a  
 Wheaton district, southern Yukon: Cairnes, 16  
 White River district: Cairnes, 14d, 15  
 Windy Arm district: Cairnes, 17a; McConnell, 05b
- Historical geology.*  
 Alaska-Yukon boundary: Cairnes, 14, 14b, c  
 Duncan Creek district: Keele, 05  
 General: Annes, 15; Dawson (G M), 88, 88b; Hayes, 92a; McConnell, 01, 02  
 Glacial deposits: McConnell, 90a  
 Glacial phenomena, Yukon district: Tyrrell, 99a  
 Gneisses, Yukon Valley: McConnell, 02a  
 Klondike district: Bell (R), 10; Dunn, 98; McConnell, 00, 00a, 05; Tyrrell, 99b  
 Klotassin area: Cairnes, 17a  
 Kluane district: McConnell, 05a  
 Lake Laberge district: Cairnes, 08b  
 Macmillan River: McConnell, 03  
 Orange group: Cairnes, 12e  
 Scroggie, Barker, Thistle, and Kirkman Creeks: Cairnes, 17  
 Section, Yukon-Alaska boundary: Cairnes, 13c  
 Sixtymile and Ladue valleys: Cockfield, 18  
 Skagway-Whitehorse-Dawson section: Cairnes 13a  
 Upper White River district: Cairnes, 15  
 Volcanic ash layer, Yukon basin: Capps, 15  
 Wheaton district, southern Yukon: Cairnes, 12, 16  
 Whitehorse district: Brewer (W M), 03  
 White Pass region: Heydon, 98  
 Windy Arm of Tagish Lake: McConnell, 05b

## Yukon—Continued.

*Mineralogy.*

- Meteorites, Gay Gulch and Skookum: Johnston (R A A), 15a  
 Yukonite: Tyrrell, 14

*Paleontology.*

- Arctotherium, Pleistocene, Yukon: Lambe, 11  
 Bison, Klondike Creek gravels: Whiteaves, 03b  
 Bythotrephes: Ami, 05d  
 Cambrian: Burling, 14b  
 Cretaceous: Whiteaves, 89b  
 Equus, Pleistocene: Hay (O P), 17a  
 Mammoth: Dawson (G M), 94a  
 Mastodon, Yukon Valley: Osgood, 05  
 Pleistocene camel: Gidley, 13  
 Scaphoceros tyrrelli, Klondike region: Osgood, 05a

*Petrology.*

- General: Adams (F D), 88  
 Granite: Adams (F D), 91  
 Pseudo-leucite: Knight (C W), 06

*Physical geology.*

- Rock glaciers: Tyrrell, 10b

*Physiographic geology.*

- Differential erosion and equiplanation: Cairnes, 12d  
 General: Hayes, 92a  
 Ice cliffs, White River: Gorman, 00; Hayes, 00a  
 Klondike district: Tyrrell, 12b  
 Surface geology: Nordenskjöld, 99a

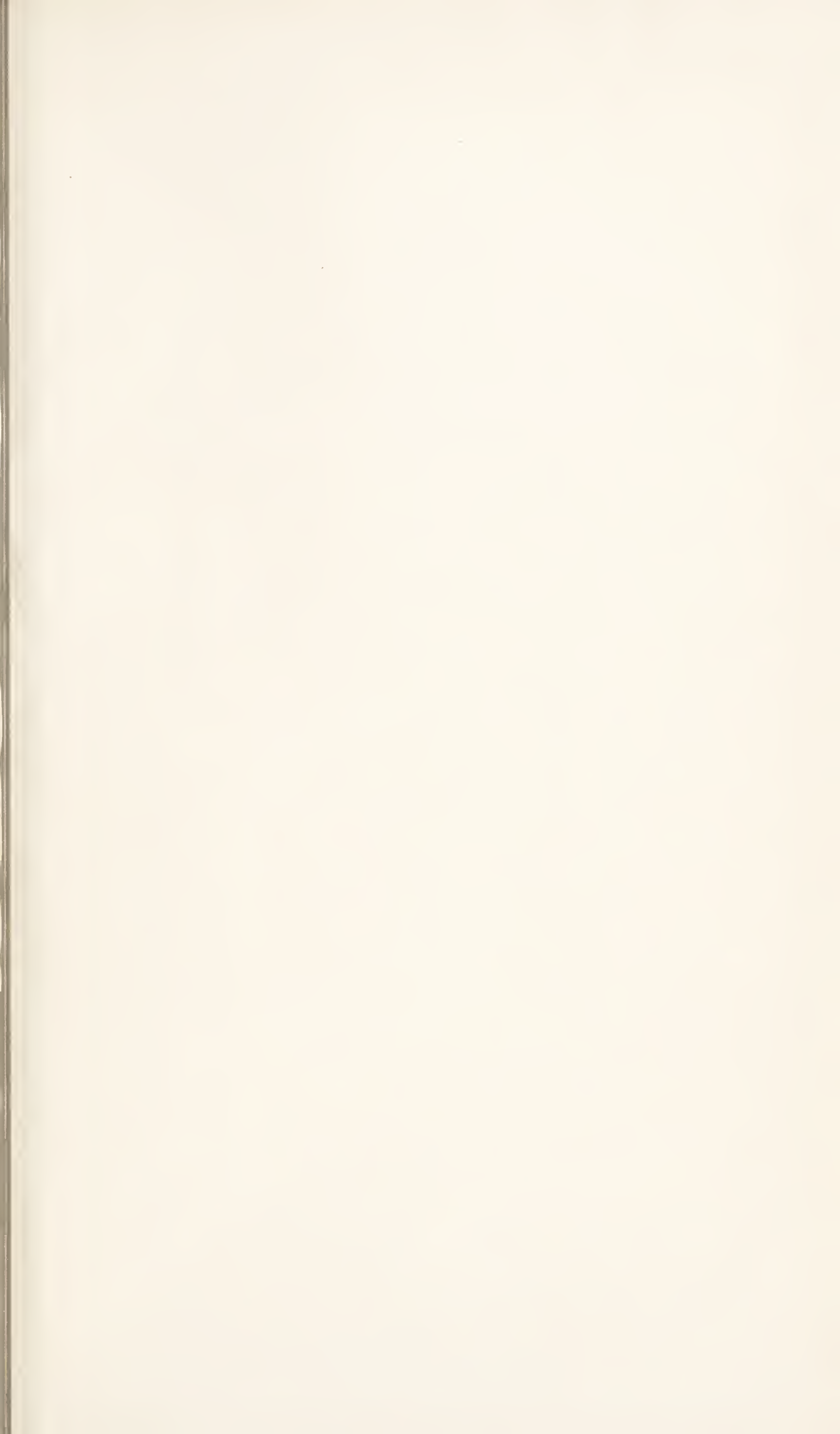
*Underground water.*

- Artesian well, Klondike: Tyrrell, 03  
 Yukon-Alaska boundary: Cairnes, 12a  
 Zaphrentis, revision: O'Connell, 14  
 Zatrachys: Case (E C), 07d  
 Zeuglodon: Conrad, 40b; Emmons (E), 45a, c; Gidley, 13b; Lucas (F A), 95a; Anon, 45a
- Zinc. See also names of zinc-producing States.*  
 Characteristics of zinc deposits: Nason, 17  
 Eastern States: Dunlop, 15  
 Enrichment of ore deposits: Emmons (W H), 17  
 Galena-Joplin district: Haworth, 00b  
 General: Joseph, 16b; Kirchhoff, 83b; Nason, 17a; Siebenthal, 08d  
 Joplin deposits: Bain, 16  
 Mississippi Valley: Bain, 06, 07; Buckley, 07a, c; Jenney, 94; Keyes, 02d; Van Hise, 01a, 02b  
 Missouri-Kansas-Oklahoma zinc district: Wright (C A), 18  
 Oxidized ores, formation from sulphide: Wang, 15  
 Ozark region: Bain, 01  
 United States: Bain, 05d; Clerc, 83; Demaret, 04a; Ingalls, 08; Lindgren, 09b; Siebenthal, 16, 17, 17a; U S G S, 83

*Zircon.*

- General: Baskerville, 08; Pratt, 02e; Schaller, 17c, 18; Sterrett, 07c; Venable, 92  
 North Carolina: Pratt, 16  
 Virginia: Watson (T L), 12e, 13, 16a  
 Zirkelite: Wadsworth, 98b  
 Zonal growth in hematite: Sosman, 17  
 Zúñi salt lake, N. Mex.: Darton 05h  
 Zygodon, Alabama: Buckley, 43







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